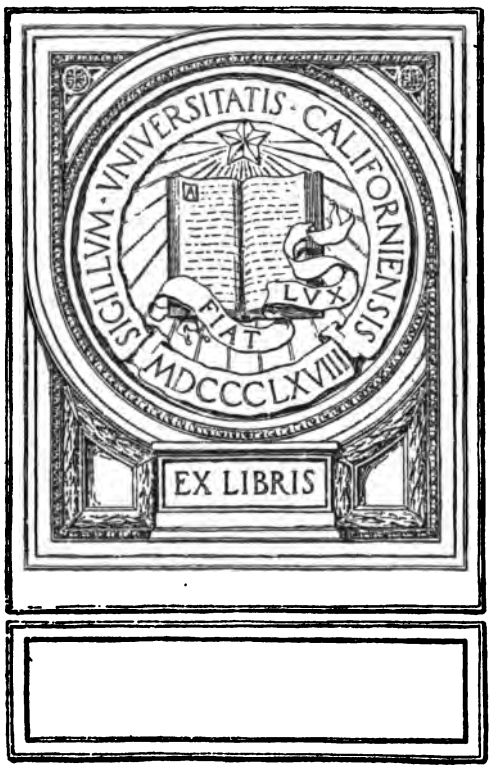
The Backward Child

A Study of the Psychology and Treatment of Backwardness



The Backward Child

A Study of the Psychology and Treatment of Backwardness

A Practical Manual for Teachers and Students

By

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With an Introduction by

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INTRODUCTION

THE problem of backwardness in children is one which necessarily occupies the attention of school administrators. A solution was expected by many when medical inspection of school children became general. Undertaken first as a public health measure, the medical inspection was soon centred on the detection and the correction of physical defects found in school children. We were then flooded with information as to the number of children suffering from defective vision, defective nasal breathing, malnutrition, etc. A vigorous campaign was carried on for their correction. Teachers and school superintendents looked for the almost total elimination of the problem of retardation when physical defects were corrected. This, however, was not the case. Certain children were still unable to make progress. Disci-

pline was no whit easier. Another remedy was needed.

The remedy lies in the recognition of individual differences in the mental make-up of school children. Gross differences we have recognised, at least since the time of Seguin and Itard. Of the finer distinctions we have been unconscious, as is evidenced by the general uniformity in school curricula throughout the country; the literature on methods of teaching; the training given to persons desirous of entering upon teaching as their life work. Because we could see the damage done to children's bodies by hours spent at desks too large or too small, we have now provided adjustable seats and desks. Because we could not see the damage —either positive or negative—which is done to the minds of children who are forced to attend a school where the particular mental differences and difficulties are not understood, we have put the whole burden upon the child and called him stupid.

Mrs. Morgan's work is an effort to direct

the minds of teachers to this point. No one can read this book without feeling the absolute necessity of breaking into smaller sections this great group of backward children, in some such way as the physician has separated the group of sick persons into those with digestive disorders, nervous disorders, circulatory disorders, etc. Unless the physician can localize the disturbance from which his patient is suffering, he is bound to do experimental work, and by a process of elimination seek to establish principles of treatment. Similar work with backward children will result in groups of those with disorders of attention, deficiencies of volitional control, etc. To carry the analogy a step further,—it is realized that the physician has to reckon with personal idiosyncrasies when he prescribes medicine. All who need a stimulant cannot take quinine.

What is the practice in treating backward children? We assume that what the backward child needs is not different mental stimulants, but more of the same thing. As

a consequence, we have classes for backward children where the bare bones of reading, writing, and arithmetic are offered. The effort is made to give these children the elements of education without any knowledge of their ability to get control of and to use the particular elements offered. We never question the ability of a child to learn to read; we assume that each child is able to learn long division. When they fail to do either, we never question the appeal made by the teacher in her work. The type of thing the child remembers is seldom known; the way in which he attends, the relation between his emotional life, his power of imagination, and his volitional control almost never modify his school experiences. We have taken for granted and trained accordingly the most complex mechanism in man,—the human mind. We have haggled, and are still haggling with its intricate yet delicate, instinctive, perceptive, emotional, and volitional power. The teacher of some day will look back upon us as we look upon the

soothsayers and astrologers of a much earlier time. As they did, so we are doing, ladling out our notions and our cure-alls. As they treated, all bad health was alike; so, generally speaking, is our treatment of all mental defects the same. The children of the muses are not fed on the ambrosia of the gods. The school treatment of the leaders of men to be, does not differ one iota from that of the man with the hoe; the same kind and amount of food is given to all children in the elementary school.

The teacher of the future, not too far distant, will want to know—not that the child is backward, but in what particular area of his mental functioning he is strong, and where weakness dominates. She will want to know how he is to be trained; what sense appeal to make; she will ask that an educational prescription be given in order to save her own strength and to conserve the pupil's self-respect.

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December 1, 1913.

AUTHOR'S PREFACE

MENTAL analysis looks to a future when teachers will so understand every child's mental structure that his whole education will be directed to the fortifying of his weak points and the development of his tendencies.

The present analysis is applied to backward children because they are one of the most insistent of present school questions. It is an effort to persuade teachers and parents, in spite of a hide-bound educational system, to study the children that interest them as individuals, and to recognise their faculties and tendencies as intelligently as they do their habits and manners.

I first noticed the existence of a practically untouched field by observing the gap between the psychologists and neurologists, on the one hand, who are intent

on the mental side upon classifying, and on the other hand the teachers who are eager for expert knowledge but unable to use its results. Accordingly an experimental clinic was conducted for two years in New York City, in which children were tested and then trained in the particular deficiency which that examination had revealed.

The material offered in this book is based upon the verifications of that clinic. I have been unable, among the mass of writing upon psychological and pedagogical subjects, to find any work which analyses mental operations into their component parts and builds a scheme of training upon that diagnosis. It is with full consciousness, therefore, both of the scope and the novelty of my subject, that I present it, and in considering my temerity I beg to express a warm appreciation of Miss Farrell's insight and encouragement.

B. S. M.

New York,
1913.

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CHAPTER I

THE BACKWARD CHILD

THE backward child is often a subtle and baffling personality. In the long list of school problems there is none more difficult than his, none which yields more grudgingly to direct attack. He stands on the border-line between the normal and feeble-minded, and the way in which his mental shortcomings are treated may determine whether he joins ultimately one class or the other. To put it in another way, the backward child must be brought up to the mark; otherwise he will grow to maturity as an incompetent or as a potential criminal.

The work of breaking down the barriers

which hedge him in is the peculiar business of the schools. Teachers in every large city know how many backward children are presented to them each year and how seriously they clog the classes. At the same time, the hope of the backward child lies in the teacher, for he comes to school at that period of his life when his mind is most readily shaped.

Backwardness manifests itself in diffuse and indefinite ways—a complete and apparently impenetrable dulness, irritability in small matters, inability to master this subject or that. Teachers know that continual drilling has very little effect. The child is as dull, as irritable, as uncomprehending as he was before. In other words, general measures do not reach general effects. But as a matter of fact, in the make-up of every backward child a specific cause lies at the root of his retardation. This cause can be determined; it can be directly attacked, and its removal means the clearing up of the general haze.

The direct way to make such a determination is by mental analysis. Certain intellectual faculties come into play with every thought and every act; consequently the clearness of the thought and the effectiveness of the act depend upon the individual quality of these faculties and on the harmony with which they work together. The impression which the teacher gathers is the result of this co-ordination or lack of it, and to understand the case she must analyse the factors in the co-ordination.

Mental analysis is not a substitute for any of the agencies in the educational field. It does not duplicate the work of the neurologist or medical specialist because it is concerned with mental diagnosis. Physical building up improves a child's general mental action just as rain stimulates the yield of the earth, but it does not cure a special mental fault any more than the rain supplies the peculiar chemical elements which the ground needs. Neither does the scheme of mental analysis set forth in this book touch in any

way the purposes of the Binet and Simon tests, which are aimed solely at classifying backward children, and which throw no light on individual peculiarities and offer no suggestions for cure. Nor does this mental analysis meet at any point the system of the Dottoressa Montessori, which is devised for the development of young children largely through sense stimulation.

The principle of mental analysis, in striking at the cause and not the effect of backwardness, is applied in the use of simple tests which the child performs and in so doing reveals to the teacher the unconscious mechanism of his mind. The scheme of mental analysis set forth in the following pages equips the teacher with the means to find out where a child's mind is at fault. While it uses some of the classic Binet and Simon tests, the point of departure is entirely different. The tests have been selected as bringing into play the mental faculties which must be analysed, and in selecting them it has been a special point to avoid any

device which would illustrate the effect of the school training on the child rather than the native ability of the child himself. Laboratory conditions and the measurements of the neurologist's examination are dispensed with because the slight hitch in the working of a child's mind is too subtle to be detected by charts or pulse tests. But the examiner, sitting casually with the child as if playing with him, makes a comparative determination as to which faculties are weak, without attempting the misleading exactness of a percentage.

The psychological basis of the tests is explained in the following chapters in as much detail as is practical. Experiments in training are described as foundations which a teacher can build upon and broaden. These experiments were made upon individual children in daily periods of three-quarters of an hour, and they were made by untrained persons working under precise directions based upon the showing of the examination. The results show that just

as a person's physical health is improved by using a prescription of medicine which takes very little time as he goes about his affairs, so a mentally backward child can be brought up to par by daily attention to the actual root of his trouble. Three points are especially important: the training must be individual, or the effect will be blurred; it must be for a short period at a time or it will be neutralised by fatigue; and all the devices used must be focused on the deficiency revealed by the examination.

So essential is this last point that we revert to the independent value of the examination itself. Even when a teacher can not arrange for special training, she gains immeasurably in her general classwork if she understands her backward children in the light of mental analysis and can bring an appreciation of each child's mental peculiarities to bear upon the persistent types of backwardness.

CHAPTER II

PSYCHOLOGICAL BASIS

IMITATION is a child's self-defence. He very soon finds out that most grown people like him best when he makes himself a pattern of something which they already have in mind. He is praised when he measures up to their standard, and he is blamed when he falls below it. So at the first suspicion of trouble, he takes refuge in conforming to a mould created by what other children demand and his elders prescribe.

If the normal child has to shelter himself in a common standard, the slightly abnormal child feels a much greater impulse to do so. He is dimly conscious, it may be, of some difference between him and other children which is not in his favour. If he were actually

feeble-minded, he would not be sensitive enough to know where he missed or what he should imitate. If he were entirely normal, there would be times when his sense of mental and physical fitness would give him assurance to be individual. But if he is on the border-line between the feeble-minded and the normal, he is always wanting to be like others and so hide from observation and possible disapproval.

The teacher who would persuade the child into showing how his mind actually does its work, must not allow the possibility of praise or blame to enter the child's mind, for the instinctive defence of imitation makes him, for the sake of approval, do everything as he thinks the teacher wants it instead of following his natural impulse. And in order that the teacher should have the observing rather than the critical attitude she must approach the examination with the idea of bringing into play certain mental activities which are fundamental to the thought processes of everyone, whatever his degree of

intelligence. In other words, she must have a clear notion of the psychological structure which she is about to explore.

The following outline of mental faculties and their relations to each other will serve as a basis to the more detailed discussions of psychological analysis.

We will regard the child's mind as having roughly four primary processes with which to work:

Sense impressions;

Recollections of sense impressions;

Association channels which partly determine and partly are determined by them; and

Abstraction processes by which impressions are translated into ideas.

And as the child grows, these fundamental faculties, by increasing and interworking, elaborate into

Imagination,

Reasoning,

Expression.

Sense impressions—sights and sounds and touches, and, of slightly later development,

tastes and smells—are the first impressions that the world makes on a baby. He sees a rattle and he hears it go, and his idea of the rattle becomes a combination of how it looks and sounds. His idea of his milk bottle is a combination of the long white thing that he sees, and his empty feeling going away.

And then later he gets more elaborate combinations. If he throws a stone at a window, it makes a noise as well as when he throws it at a board fence; but the first noise means breaking the window, and that in its turn brings some unpleasantness which he comes to understand as punishment.

But one of the first abstract differences that a child learns is the difference between wrong and inexpediency. It is impossible to delude a child into believing that punishment is as inevitable as other consequences. For instance, if a child climbs on a chair and stands too near the edge, the chair tips over and he gets a fall. But not for a moment does he confuse the fall, which he sees must

happen under those conditions, with the punishment he gets for breaking a window, which he cannot help seeing is quite unrelated to the cast of the stone and the smash of the glass. So the first moral idea is the difference between wrong and inexpediency, and the lessons of inexpediency bite deeper, because Nature's laws work more inexorably than those of man.

In fact, so convinced was Rousseau that left to herself Nature would bring up a child with perfect wisdom, that he based a whole system of education on letting a child bear the consequences of his own acts. Do not punish the child for breaking the window; let the window stay unmended, and let the child suffer cold. But it is precisely the moral sense that would suffer under such a system. Suppose that the child did learn, through suffering cold, not to break windows, the lesson would apply only to windows, it would carry no general idea of respecting property, and since he must live in a man-made world, would prolong the process of

education beyond patience. So much is evident. Rousseau's idea was a reaction against the prevailing method of corporal punishment. He saw such a punishment to be ineffective, but he did not realise the reason: that it is useless to imitate in punishment the methods of chastisement which Nature has reserved for violations of herself, for we can never give to corporal punishment the fatalistic swiftness that makes Nature's retribution chiefly effective, and if we must raise moral issues, we must develop abstract sensibilities to meet them.

One takes an illustration like this dawning distinction between wrong and inexpediency to understand a little the infinitely complex interweaving of sense impressions, memories, associations, and abstractions. But, after a certain point, this mental complexity gets beyond the range of description, and it straightens out, even partially, only under analysis.

Now as the child grows, conditioned by a thousand infinitesimal incidents which

we can neither predict nor trace, he develops faint tendencies which in their turn determine the more pronounced qualities of his later years. He is more sensitive to colour and form, for instance, than to sound, so that he will call up more readily how he saw a thing than how he heard it. Many people will say that their idea of a concert, when they think of it, is the strokes of the conductor's baton. Or he may be sensitive to sound, that is ear-minded, and will say that the humming of bees is his mental image of a sunny meadow. But besides the tendency to favour one or the other sense, many people lose their mental sensitivity to sensations in general, the sensations which originally were the foundation of all their ideas. This sense dulness that one finds is often not a physical matter (since examination shows no defect in the sense organ), but it is a mental quality which is of some importance in understanding the interplay of faculties.

Now as the primitive impressions of the

senses expand and elaborate into ideas, so that most of the impressions come to us directly as ideas instead of formerly as sensations, it appears that we can get an impression in two ways: we can get it as a whole, or we can get it in parts. If we introspect, we shall find that either we are more disposed to ask in such and such circumstances, what will the outcome be, or our interest is more excited to know, in such and such a combination, why is it, what has brought it about? The normal person's mind is receptive to both kinds of impression, is active in both kinds of inquiry, just as he gets facility with both hands, but he nevertheless remains a little more apt in one direction or the other. This psychological mould, as one might call it, has determined two great schools of philosophy, the inductive and the deductive.

The inductive turn of mind is the one which makes for details, for working the outcome of a chain of events; it is the turn of mind which produces scientists, and far-

seeing business men, and which in the school-room makes a child better at arithmetic than grammar, but better at composition than geometry. In psychological terms, the inductive turn of mind is the synthetic mind, seeking to bind parts into a whole, working to make something out of the given materials.

The deductive or analytical turn of mind is less practical, and therefore less often met with in its pronounced form nowadays. Until modern times, the two casts of mind were for the most part the sign of a man's calling. The deductive men were scholars, the inductive were practical men of affairs. But with the spread of knowledge these same men of affairs began to apply general principles to get particular results, until Bacon once and for all split off science from philosophy by declaring that the truth can be arrived at only by following a train of particular circumstances to their conclusion; in other words, by experiment. The inductive man, the synthetically-minded

man, therefore, is the type of successful man to-day. But leaving the extreme case with which we have pointed the distinction, there remains a predisposed cast of mind. It is not the part of education to foster one or the other, but if the teacher knows in which of two ways an idea is most readily grasped, the business of explanation is simplified.

This constitutional cast of mind and the distribution of sensitivity previously described, determine the process of presentation. But interwoven with presentation so closely that the distinction is largely figurative, is the process of representation, the vehicles of which are attention and memory. The close analysis of attention and memory are of prime importance in understanding school children. To say that a child does not pay attention, explains nothing, for analysis shows not one but three kinds of attention.

In the first place, there is the faculty of getting a very definite impression without, as we say, "paying attention." The appearance of a room, in which we were ab-

sorbed in talk, how someone looked in the street whom we saw and did not look at, and a thousand fleeting impressions whose haziness or clarity is of the utmost importance in mental activity—this is simultaneous attention. When, however, we give conscious thought to a thing in hand, our effectiveness depends partly on will power and partly on the quality of the second type, or homogeneous attention, which is another way of saying the persistence of attention, and which of all faculties responds best to training. The degree of facility in doing two things at once is roughly the meaning of disparate attention.

Again, in commenting on a child's memory, it is futile to say, "He never seems to remember anything," for it may be that of his three types of memory, two may be fairly normal and will become quite so when the third type is trained. Faulty memory of some kind underlies a great deal of backwardness, but to correct it the teacher must know whether the child has trouble in re-

membering a series of impressions that come too fast to allow the formation of associations, which is automatic memory; or whether his difficulty is in the conscious effort to memorise by forming associations, which is voluntary memory; or whether with both these processes working properly, he cannot seem to hold what he has in mind, which is retentive memory.

One cannot experiment much in memory without realising how largely it is interwoven with and determined by associations. The whole training of voluntary memory in fact is primarily to increase and direct associations. But most of our associations are unconsciously formed, so that by the time a child has reached the age of ten, he has a considerable mass of associative material and some well-marked tendencies which are worth studying for the clues they give to his habits of thought.

Habits of thought, in turn, depend for their very existence on the process of abstraction, or the translating of impressions

into ideas, which is so fundamental that we usually take no account of it. But the teacher who finds a difficulty with arithmetic or with reading will go to the root of the matter if she examines the way in which the child is turning concrete symbols into the ideas of word and number which are expected from him.

These faculties which we have been enumerating, sensation and perception, attention and memory, association and abstraction, are to be regarded as structural faculties. They are the very foundation of mental life and the machinery of our every thought from the recognition of a friend to the binomial theorem. These too are the faculties which chiefly concern the teacher of elementary schools and among which she is apt to find the child's underlying difficulty. But the bare branches of a tree are not its glory, and the framework of a man's mind is not the measure of his personality. Reasoning, expression, and, at the very top, creative imagination, are the

expansion, the outflowering, as it were, of memory, association, abstraction, and the rest. And so the faintest signal of activity in these highly endowed faculties must catch the teacher's interest and find her constant encouragement.

The analysis of the faculties, both structural and expansive, will be discussed chapter by chapter; and the reader who has been tracing their inter-relations in the previous pages will have a clearer idea of the conclusions to be drawn from the child's reactions if the following mental chart is remembered:

STRUCTURAL FACULTIES

	I	III
Sensation Perception	Faculties of Presentation	Association
	II	IV
Attention Memory	Faculties of Representation	Abstraction

EXPANSIVE FACULTIES

I
Judgment and Reasoning
II
Expression and Response
III
Imagination and Invention

CHAPTER III

GIVING THE TESTS

THE mind of a child does not lie open to the casual observer. No child gives his intimacy readily, and in particular a backward child who is probably conscious of his peculiarities must be very delicately persuaded into revealing whatever discord exists among his faculties. The tests used for this persuasion are a kind of abbreviation of the activities of a child's life which is passed among people incapable of understanding the signals of disorder. And so these tests are very simple and every circumstance of the examination is to be quite easy and casual, for a child's self-consciousness is quickly awakened and it lies largely with the examiner whether the examination shall be an ordeal or a pastime.

From a point of view rather different from the accepted one, it is not the child but the examiner who makes the effort. The child does as he pleases, and the examiner with the closest attention creates a haphazard atmosphere, and yet draws precise conclusions. An examination such as this demands that a teacher lay aside momentarily the habit of instruction, because the child's mind must not be guided or taught while he is doing the tests any more than his playmates on the street guide or teach him. It does not matter whether he does them right, but it matters altogether how he does them, and so, even if at first he misunderstands what he is to do, the examiner must not check him, but must watch for a possible clue in what he does do.

It is of advantage in preventing one's personal manner from crystallising to give the tests always in different order, much as they come to hand. Examiners often administer the Binet tests like so many doses, with a result of unfair grading. This is bad

enough, but when the object of an examination is more than simply to classify, the effect of an automatic manner is much worse. An examination, which has for its purpose to find out in all the subtle windings of a child's mind where its peculiar trouble lies, must not be given mechanically or that very purpose will be frustrated.

Another drawback is the presence in the room of anyone other than the examiner and the child. It is impossible to abate a child's self-consciousness when he knows he is being watched, but the examiner can pretend to pay no attention and the child will forget himself in what he is doing.

Anyone who undertakes to examine children is asked to discover the reasons for the most varied complaints, from "hyper-apperception," as a bewildered teacher said, to general disobedience. Most common, perhaps, are lack of attention, slowness in taking things in, or great difficulty in some particular subject. A teacher once sent to the writer a bright-looking girl of eleven

who could not learn to read. She could not even learn her letters, although she was ready enough in other subjects. It developed that three years previously she had fallen out of a third-story window, and they thought that the trouble with letters began then. Still, since the fall had neither killed her nor made her an idiot, there was evidently something to be done, and first of all, to find out why she could not learn her letters.

When she came in she seemed not exactly frightened, but wondering what it was all about.

"Maggie," I said, "can you do a picture puzzle?"

"No," said Maggie.

"It's quite easy. See, here on this piece is the head of a cat, so you look around and find the cat's body and tail."

She did.

"And then you fit those two pieces together like this."

It was a small easy picture puzzle, showing a little girl and a baby looking at some farm-

yard animals, a hen and a little chicken, a rabbit in its hutch, and a cat with a saucer of milk. Although I had shown her how to look for the missing parts of an animal, Maggie did not care to go at it that way, and I let her alone. She matched the pieces by shape partly, more by colour, but she never insisted on making a piece go where it did not belong. She knew all the animals quite well, and we fell into conversation about the country and some ducks she had seen one summer.

Some children describe vividly what they saw, and others think more about what they did. If one asks a child to draw what he is talking about, it usually happens that the tongue-tied child knows exactly what he wants to put on paper, and the child that is free of speech is quite put out with paper and pencil.

But Maggie preferred to talk.

"See if you can draw a chicken just like this," I said, showing her an outline.

She made a fairly good copy as to size and

proportion, and yet it did not look much like the original. This form sense, which Maggie apparently had little of, is more common than the sense of size and proportion which she showed. Especially children who draw with facility—I am not considering now a talent for drawing—have enough form sense so that their meaning is plain, although the proportions are ludicrous.

One must never comment on what a child does, unless he is frightened and needs encouragement. Maggie was evidently entertained, especially as I was scribbling some drawings at the same time, so we went on talking. I showed her some pictures—an automobile, a bed, a shoe, a horse, a chicken, all pasted on one sheet of cardboard. I simply showed them for a moment, and then asked her what she had seen.

"A nottermobile," she said, "a bed with a lady making it, and a little chicken."

"Nothing else?" I said.

"No," said Maggie.

"See if you can say after me: four—eight—three—six," I said quite rapidly.

"Four—eight—three—six," said Maggie.

"Seven—three—nine—eleven—twelve," I said again.

"Seven—three—nine—eleven—twelve," said Maggie.

"Four—six—two—ten—three—eight," I said, avoiding any rhythm in my voice.

"Four—six—two—eight—three—nine," said Maggie, and I went on with other combinations till I was sure that a series of five was her limit of correctness.

Then I took the silhouettes of seven animals drawn on separate cards and put them in a row.

"Look at them," I said, "and when you know by heart how they come, mix them up and see if you can put them down the same way."

She did not look at them long, and when she tried to put them down again, she could not get the order right. When she studied the original longer, she was even farther away

from the right order. I took one card away, still she missed, and finally with four cards she did it.

I asked her what was the answer of 5 plus 3 minus 2, and she gave the right answer at once without counting on her fingers. Harder sums she did equally well, but I didn't try her till she failed, for I was concerned only in discovering her facilities, and I did not wish any likeness to a lesson.

I opened a book of large print, and asked her if she knew any of the letters. She was quite sure of only O. So I told her to take her pencil and cross out all the O's she could find. She began, and for some time did pretty well, but although she apparently gave the same concentration to the end of the page, her attention was unsuccessful and she left out a good many.

I tested her colour sense by having her sort worsteds that shaded into each other, and found it to be keen. But her sense of sound was so dull that when I pronounced the letter sounds of C–A–T, *i. e.*, *K–A–T*,

and asked what word it was, Maggie said "Rat." When I made the sounds of M–A–T, she said "Got," and so on, through a number of curious aberrations.

Since Maggie did not know her letters, some of the tests were naturally impossible, but even with this incomplete examination I had enough facts in hand to understand the trouble.

From Maggie's answers and actions evidence had to be gathered and set down which would show the real reason why she had not learned her letters. The first thing observed was that she tried to match the parts of the picture puzzle by colour rather than by shape. This was an indication, at least, of an undeveloped sense of form, for the shape of the pieces in a picture puzzle is usually a more obvious guide than the colours, which are indefinite. This indication was borne out when she tried to copy the chicken. She got the size about right and the head and tail were in about the right relation to each other, and yet her outline looked like nothing ever seen.

The ability that Maggie showed in noticing the pictures on the card and repeating the numbers in series was negative testimony. But when she could not remember seven, then six, then five silhouette animals in order, with plenty of time to study them, it was evident that her stock of associations was small and tardily set in motion. As she looked at the animals no faint stimulus quickened the association channels to form a little mise-en-scène about each one. Although she was quite familiar with all of them from geography and from visits to the country, nevertheless each one remained an unleavened lump in her mind, and her voluntary memory, unsupported by associations, could not hold so many undigested bits at once.

Her handling of the mental arithmetic sum was unusual, because she did not try to help herself with fingers or other mental crutches, as so many children do who never quite bridge the gap from the concrete to the abstract. So it was evidently not abstrac-

tion, *i. e.*, the translation of letters into ideas, which was keeping Maggie back.

When she was crossing out O's Maggie showed a signal which is often overlooked, the signal of fatigue. Psychological fatigue is different from ordinary weariness or boredom, and the noticeable difference is that in the last two the child's attention perceptibly flags and he wants to stop, whereas in fatigue he is seemingly paying attention as hard as ever. This attention is not effective, however, and he misses and makes mistakes without knowing it. So it was with Maggie. This characteristic of fatigue must be allowed for in any scheme of training, for it interferes almost against the child's will with the persistence of homogeneous attention.

When Maggie tried to compose the letters C–A–T into a word, she became confused, and instead of the K sound of C, she produced almost any sound at random, which at the time happened to be R. Another time it was an M or H sound without consistency.

So it was evident that her sound discrimination was very dull. I accounted for her learning to talk correctly on the ground that words had vivid associations in ideas which letters lack, and also on the ground of unconscious imitation. And that this dull sense of sound was a mental quality was further established by a test which showed her physical sense of hearing to be normal.

Putting these observations together, it appeared that the chief facts for the diagnosis were poor sense of form, poor sense of sound, limited associations. And applying these facts to her difficulty with letters it was clear that since sounds as such made very little impression on her, isolated letters like K–P–M would be hard to differentiate. And, in addition, when these vague sounds were not reinforced by individual associations they would pass from Maggie's mind like stones from the surface of a pool. Now the average child in learning his letters connects the shape of a letter with its sound, and the two ideas mutually re-enforce each other.

But in Maggie's case a dim and confused impression of the form of a letter added to an already vague and confused impression of its sound left her without any terra firma on which to base an idea.

In considering this diagnosis, and how best to train her, it was evident that the training must multiply her associations and sharpen her impressions of sound. In talking with her I had found that, in spite of this dulness of sense of sound, she was mentally more ear-minded than visual-minded. She remembered more the sounds of things, especially musical sounds, than how they looked. Here was a suggestion. I had the twenty-six letters of the alphabet printed plainly on the white keys of a piano, beginning at the C below middle C and calling it A, and so on through the alphabet, H on middle C, O an octave above, and V on high C.

Maggie thereupon learned to play "My Country 'Tis of Thee" and "The Wearing of the Green" with one finger, so pitched that they covered the alphabet. She called

the notes as she struck them according to the letter printed on the key. At first, of course, she began by simply learning by rote.

"H–H–I–G–H–I" she would chant, beginning "My Country 'Tis of Thee" on middle C. But it took a good while simply to learn the tune consecutively on the piano, and as she chanted and stumbled and began over, two purposes were accomplished. She learned the different sounds of the letters, because each one was intensified by constant association with the more vivid sound of the musical note, and with this revivifying of the letters she learned the sequence of the alphabet. Then, since she always had to look for the note she was to strike next, and since each note was plainly inked with a letter, she came to identify the name or sound of the letter which she was saying with the shape she was looking for.

To deepen further these association paths, she made A's and B's and so on, saying the

name of the letter three times as she was making it; and the well-known device of cutting letters out of different coloured papers utilised her colour sense and served the same purpose. At first she was only expected to learn one letter a day; she would begin with the cutting out and the repetition as she wrote, and the piano came last as a sort of game, because it seemed best to let the more indirect associations be formed unconsciously. The time given to training Maggie was twenty-five minutes a day for seven weeks, and at the end of that time she knew her letters well enough to begin combinations into words.

I have cited Maggie as an example of a child whose difficulty should be attacked directly, and for the purpose of showing without too much detail how the examination is given. But one is not always so fortunate as to have a clear-cut and specific complaint. By far the greater number of backward children are just generally dull, according to their teachers, but nevertheless present even

greater interest and difficulty of analysis. Accordingly the following chapters are a more detailed description of the examination and its basis.

CHAPTER IV

TYPES OF ATTENTION

ONE often sees a child who appears to concentrate, who gives his attention with the best will in the world, but who nevertheless cannot quite make it tell. And one meets even more often the child who, as we say, simply does not pay attention.

Excluding for the present discussion the cases of stubbornness and of physical lassitude, there still remain many instances of faulty attention which affect not only the child's attitude in class but the quality of his work.

To discover the difficulty, the teacher must first abandon the idea that attention is a single process. Attention works in three ways. It works homogeneously; that is, giving attention to one thing over a period

of time, or, as we say, concentrating. It works simultaneously; that is, giving attention to a number of things all at once, or, as we say, observing. And it works disparately; that is, giving attention to more than one thing over a period of time—in other words, doing two things at once.

These three types of attention, homogeneous, simultaneous, and disparate, are apparently unrelated; one may be at fault without affecting the others. They are considered separately, therefore, with their several tests and methods of training.

Homogeneous Attention

This faculty is best described, perhaps, by its test. Open a book of large print at any page, and ask the child to cross out all the T's he can find, or the E's. This test measures the efficiency of the process by which a voluntary act becomes mechanical. At first the child looks carefully for the T's, looks back over a line, perhaps, to see if he has missed any. Then the mental image of a

T gradually takes on so definite a form in his mind's eye that the other letters become more or less indistinct, and for the time being the shape T alone gives a vivid stimulus, so that crossing it out becomes practically automatic.

This is the process in its proper working order. And as the involuntary brain centres take over more completely the activity started voluntarily, so much the less does the element of fatigue enter.

For the effective working of homogeneous attention, several things are essential. If a child begins at the middle of a page to cross out T's and skips about, his concentration on T's is constantly jolted, and therefore must remain a conscious effort. Regularity is of course essential to mechanical action. And conscious mental effort produces fatigue, which lessens its efficiency just as it lessens the efficiency of conscious muscular effort.

In addition to regularity, an essential in homogeneous attention is a sharp focusing of consciousness at the beginning. If a

child has a hazy notion of a T, and a vague realisation of its differences from other letters, he will not get the clear-cut image of T which is necessary before it can be translated into effective mechanical action.

Insufficient nourishment is apt to show first in homogeneous attention. The thin blood supply as it flows through the brain does not carry a continuous stimulant to the act of attention, which must be sustained, and in an undernourished child as his attention flags and he misses the letter, one can almost see an exhausted blood pulse beat through an active brain cell. It is assumed that a condition so obvious as undernourishment has been detected, and its effect on homogeneous attention is merely mentioned to show that the quality of attention may become normal with better health.

Homogeneous attention is somewhat the parallel of physical co-ordination. It may be that in a child of fourteen or fifteen the crossing of a single letter is mechanical from

the outset, and therefore scarcely a measure of homogeneous attention, which, as has been said, makes the transfer from conscious to mechanical action. The test may in such cases be given as the crossing of two letters with different strokes, for instance, T with a vertical stroke and A with a horizontal one; or, R with a vertical and E with a horizontal line. The same mental process takes place in a more complicated form, just as describing a circle with the left arm might be quite an effort of co-ordination for a little child, although to test an older one it would have to be more complex, like catching a ball.

If the examiner wishes to make statistics, he can, after the examination is over, reckon the percentage of letters missed. The actual percentage, however, is not of itself a complete account. It must be noted whether the child is more accurate at the beginning or the end. If it is at the beginning, when he is probably making more or less of a conscious effort, it is an indication of some defect in his mechanical processes, and of the appear-

ance of fatigue. Should he be more accurate at the end it is evidence of a tendency to automatism and the child is likely to try and convert all his mental activities into rote action.

The method is to be noticed—whether the child begins at the beginning and goes straight on, or whether he goes at it haphazard; and whether when he has finished he leaves it, or goes back to look for possible mistakes. This last is an indication of thoroughness, quite unconnected, of course, with homogeneous attention; but it is in little ways like this that the child reveals himself more surely than in some test devised especially for thoroughness. The method of attack is something like the kind of a start that one takes for a running jump. It is hard to get a good jump from a bad start, although the best start in the world will not make a good jump. And so it sometimes appears that a child who starts in the middle of the page and misses a great many letters in skipping about, will prove

to have a good quality of homogeneous attention when he has been trained to take the words as they come, one after another.

It happens sometimes with children of seven to nine that they get bored with crossing the letters and stop. An Italian boy eight years old showed an attention so volatile that he would not keep on crossing out O's through one line of large print. He would say he was tired or make any excuse he could think of, but when he was kept at it, he missed scarcely any. Another boy of ten, a German Jew, plodded steadfastly through the whole page, not even looking up when I made a noise to distract him, but he missed a few letters in almost every line. These two types, which are quite frequent, show clearly that homogeneous attention is a quality distinct from will power and concentration, and that it must have a training more precise than moral discipline.

We have then in general two defects in homogeneous attention: the child misses the

letters of the test because his conscious effort does not operate with sufficient vigour to make a proper transfer to mechanical action, and he may show a decided lack of persistence; or he may persist, unsuccessfully, owing to dim mental images.

The devices found to be most successful in training homogeneous attention are:

(1) Tracing pictures: Lay tracing paper over any brightly coloured pictures, and have the child trace the outlines.

(2) Driving nails: Draw a pattern on a square twelve-inch board—lay it out in one-inch squares for instance, and tell the child to drive a nail in the upper left-hand corner of each square.

(3) Sorting pictures: Out of a great number of pictures of different sorts, not necessarily coloured, cut from magazines, tell the child to pick out all that have trees in them, for instance, or boats, or else pick two objects to be looked for in each picture, if one is too simple.

(4) Stringing beads: Fix a certain order,

like two red, three blue, one white, to be repeated through the whole string.

These devices are familiar enough. It will be noticed that they apply especially to the development of homogeneous attention. The first one, tracing pictures, trains persistence; it tends to make a habit of persistence because the child must persist in order to get the fun of making the picture. The Italian boy I spoke of got his first notion of finishing a job by tracing pictures and driving nails. He was very inaccurate at first and would go off the lines, but when the tracing paper was lifted from the picture, he would see that he had not made anything at all, and then it would be easier to keep him to the lines. In hammering nails the noise was the attraction, and though at first he would put them all over the board, after a while the amusement of making a regular pattern made him regular in that too.

Sorting pictures and stringing beads tend to develop more vivid mental images. While the normal child can single out a T and form

a clear enough image for the time being to exclude other letters, it is evident that the child who cannot do it must have a more vivid stimulus than a letter. Form and associations provide that stimulus in sorting pictures, and colour is the appeal in stringing beads.

It will be noticed that all these devices can be much simplified and a good deal elaborated. It is better to have them too simple than too complicated, so long as they are not a bore, for the object of this training is the persuasion of a habit of mind—and its object is not to give information or to reform character. The suggestions for training given above are simply the general type of thing that applies to homogeneous attention. They can be varied almost infinitely, and should be varied, because monotony induces fatigue, and fatigue has been shown to be a deterrent in homogeneous attention.

Any device which calls for persistence in one kind of action like (1) or (2), or which requires the making of a clear mental image

like (3) and (4), applies to homogeneous attention.

Simultaneous Attention

Broadly speaking, simultaneous attention is the faculty we use in observation, in what we take in at any given moment. It is the act of brain photography. The theory is being put forth that simultaneous attention is a quality of brain plasticity, and as such one of the fundamental endowments of the brain. In support of this theory it is a fact that while a normal degree of simultaneous attention can be highly trained, as it is in lawyers and detectives, very little can be done for a deficient brain plasticity. A seriously deficient simultaneous attention is not often found except in the feeble-minded, together with a lacking sense of form; in the average backward child it is often simply dull, and responds a little to specific training.

Unconscious simultaneous attention is tested by showing a child pictures of common objects pasted on cardboard. Pick out one

of them, for instance a cat, and talk a little about cats. Then take the card away and ask the child how many other things he saw.

For conscious simultaneous attention, take a similar card with different objects, and as it is shown ask the child how many of these things he can remember. Take it away in a few seconds and let him tell.

It is of interest to notice not only how many things the child remembers, but which kinds stick easiest in his mind, and whether his mind works better when he gives conscious effort to it, or whether a sudden call on conscious action tends to fluster him.

A girl of twelve was once brought to me, described as slow-witted. In school she seemed to be a good example of the generally dull, backward sort, and it was proposed to place her in an ungraded class. Her examination showed nothing remarkable save a lack of sense of rhythm, and a very poor simultaneous attention of both kinds. The first training she had was playing hide-the-thimble. The thimble was always placed

in plain sight, and nothing would help the child to find it except to focus her attention on the thing of the moment.

The immediate result of poor simultaneous attention is listlessness. The passing show does not make a great impression and interest flags. This listlessness in its turn fosters the dulness of simultaneous attention, and the first break in the circle must be made by creating one concrete object of interest in the immediate surroundings. In this case Josephine's manner would change after she came in the room, although on the street and at school she seemed as listless as before. The thimble game was varied by a game of pictures. Pictures were shown to her, at first very simple with one action, like a girl sweeping, and after looking at it for a moment she was asked what the girl was doing. And so on to more complicated ones. Here again she had to depend on the instantaneous report of her eyes. And what is particularly essential in simultaneous attention, she was obliged in the thimble game to make an

instant definition of every object she saw, and either reject or accept it as the one she looked for; which in its turn prepared her in the picture game to seize definitely on the objects that came within her range. Her range at first was small, but that was immaterial. The point was that however few, her impressions should be definite. This training for half-an-hour a day for seven weeks was varied with jackstraws, or any game that called for instant rather than persistent or reflective faculties. Josephine gradually developed a more lively manner, and was able to stay in her regular grade at school.

Disparate Attention

As it has been intimated, disparate attention, or the faculty of doing two things at once, is not of very great importance to school children. Nevertheless, in a complete examination, especially of older children, the test should be made.

A test of disparate attention is to have the

child read an easy verse of poetry and at the same time write A's on a sheet of paper. He must not do it successively, that is read a few words and then write an A, for that is a rapidly shifting homogeneous attention. But he must write them at the same time, or in other words be able to turn over one or the other activity to his involuntary brain centres. The test can be complicated by having him write the alphabet while he is reading, instead of only A's, and it is interesting to notice whether he helps himself with rhythm, that is to say writing his letters to the metre of the verse. Using rhythm is the effective device in disparate attention as it is in physical co-ordination, and the first training for disparate attention is to simplify the test and make it rhythmic.

Disparate attention is one of the few faculties which can be directly trained through physical exercises, because complex actions call for conscious and mechanical attention at the same time. Consciousness is considered to be single, and it is therefore

impossible to do at the same time two things which require conscious effort. But of any two actions which we are called upon to do at once, one or the other is probably among the thousand automatic actions with which our life is simplified. The efficient person delivers over these automatic actions to what we will call his subconscious mind; the inefficient person allows a little consciousness to leak in and therefore does not retain his full quota of consciousness for voluntary thought. The training of disparate attention then is the development of a more complete automatism in the actions that are by way of becoming mechanical.

CHAPTER V

MEMORY

TO all appearances the difference between memory and attention as psychological faculties is slight, but in making an analytical examination the distinction between them must be clearly realised.

The first point that occurs to one is that attention is a faculty for immediate use, whereas memory is a faculty for storing ideas and impressions. Attention, therefore, being the direct means of getting ideas and impressions, must bear a very definite relation to memory the storehouse, and it is that relation which must be made clear before we analyse the types of memory.

The elusive refinements of psychology will not bear too broad a light; but it is suggested that we regard attention as the native

quality of a tool, and memory as the skill of the user. Attention, that is, seems to be original material, in which actual brain plasticity is a large factor; but memory is a co-ordination, involving not only attention but association, perception, judgment, and innumerable minor faculties beside. The act of attention makes an immediate demand on mental resources in the way that a sudden strain tries the material and construction of a machine. But an act of memory works over a period of time, and its matter calls for arrangement and co-ordination. To test attention, therefore, is to bring out directly the native mental fibre, but to test memory is to test previous training rather than actual mentality.

Memory, like attention, works in three ways. The three kinds of memory are:

I. Automatic.

II. Voluntary.

III. Retentive.

With the foregoing general distinction between attention and memory, the types

of memory can be described in some detail, and later be more specifically differentiated from the three types of attention.

I. Automatic memory is the faculty we use in remembering telephone numbers, in repeating conversations—in recollecting, that is, any series of impressions to which we have given no conscious thought at the time. School children are inclined to overwork their automatic memory in learning, as we say, by rote. By conscious effort they overpress a faculty whose very characteristic is absence of consciousness, but they do not at the same time entrench their effort in associations. And the result is that what they have tried to memorise in this way is neither accurate nor permanent.

The test of automatic memory is made by saying a series of numbers at the speed of ordinary talk, and without rhythm. At first give three numbers, 7, 3, 8, and ask the child to repeat them. Then give four numbers, 6, 11, 4, 9, to be repeated; then five, six, and so on until the child misses.

If he misses at five numbers, for instance, give him several series of five, to make sure that five is his limit. Six is found to be a good average for the automatic memory of children from ten to fourteen, but five is not bad. Four shows a poor automatic memory, and three would indicate a defect, if it is certain that the child is not flustered. If a child shows good general intelligence, and a very poor automatic memory, the examiner should look to her manner of giving the test. If the numbers are sprung at a child in the manner of saying, "Now see what you can do," the result will be quite unfair to the child. For as conscious concentration improves voluntary mental action, conversely, the sudden intrusion of consciousness upon an involuntary process disturbs its workings. And so in the involuntary act of automatic memory the test must be given as unobtrusively as possible, saying simply, "Say after me 3, 9, 5, 7," in an even tone of voice. This test should be amplified by substituting for the numbers a series of unconnected

words, like "paper, wall, cold, ink, tree," given in the same manner.

In automatic memory, as indeed in testing any faculty, no absolute judgment is to be made. The test of one type of memory is valueless as it stands alone, but when it stands in comparison with other types of memory, and we can see whether it is relatively good or not, then the defect can be determined and a course of training be prescribed. The teacher's own spontaneity is important in making a good test. If she has a set of words or numbers which she gives to each child as he comes along, she will surely fall into a rhythmic and didactic manner of speaking which defeats its own purpose. To turn the virgin soil of a child's mind, the teacher must each time summon fresh energy and use untarnished tools.

The training for automatic memory has a different point of departure from the examination. For rhythm (which in testing must be avoided lest it offer a prop and

so mislead one's estimate) becomes in training a device especially to be encouraged for a poor automatic memory. For instance, say easy rhymes, like

Baby bye
See the fly,
See him crawl
Up the wall,

and have the child repeat it, at first two lines at a time, and then all four. Try at first saying it without rhythm, and the result will probably be that a child with a poor automatic memory cannot repeat it at all. A sense of rhythm can be brought to help out an automatic memory without being a factor of it, as oil helps the running of a motor without improving the actual machinery.

Rhythm may be further utilised in physical movements. The teacher makes some rapid motions, such as raising her arms above her head, touching the floor with her hands, then touching her knees, her hips, and pulling a lock of hair in front, and the

child imitates these motions. It is good to put a whimsical point, like pulling the hair, to all such training, because it gives a touch of vividness to what must seem to the child at best an arbitrary proceeding, and the training of his automatic memory will not suffer for his amusement. The teacher can vary her movements by swinging Indian clubs with a strongly punctuated rhythm. The number of motions she makes before asking the child to repeat them is determined in each case by the child's capacity. He must have just as much to reproduce as he can reproduce correctly, and as his capacity increases, so must the length of his series of exercises, mental or physical. Any number of changes can be rung on the training suggested, if the teacher will bear in mind the principle that any series of impressions to be immediately reproduced will tend to strengthen automatic memory. The result of strengthening this involuntary process is seen in greater alertness and more accurate recollection, both of the current class-

room work, and of the lessons learned by heart.

II. Voluntary memory is so complex a process, so involved with association which no one, not even one's self, can fathom, that one hesitates to discuss it save in the practical way of cause and effect. Putting it generally, voluntary memory is the faculty of forming associations consciously about an idea in order to retain it. As Professor James says, it is the act of "marrying a new truth to our old stock of truths." To use another figure, the object we wish to memorise becomes enmeshed in the strands of associations we consciously weave about it.

At the outset the distinction must be made between voluntary memory and automatic memory. The essential difference between them is this very fact of associations. In use, automatic memory is adapted for the registry of unrelated impressions; we use it in recalling names, numbers, or the isolated points of a speech. Voluntary memory connects the points of the speech into a

coherent series; it associates them with one another, or with other materials in our mental stock in trade. So it is clear that if we try to commit to memory a speech or a poem or a series of incidents without cementing the elements into a wall of associations, we are putting our automatic memory to a work for which it is not adapted. A child trying to learn by rote, going through his lessons in uncomprehending singsong, is depending upon automatic memory, and it is likely to fail him. If he binds his facts together he is apt to have better success.

The testing of voluntary memory, therefore, becomes really a test of the person's aptitude in forming voluntary associations. In some sort it is a test of the way a person handles the ideas which make up the loose material of his mind. In children, voluntary memory is the faculty which the school most directly taxes, and consequently the test in this examination, which is to disclose the child's native ability, must not be of the sort which only tries the school training. The

habit of learning verses parrot fashion is so deeply-rooted in school children that it has become no test of voluntary memory at all, but the following test, while not exhaustive, has been found to show the native quality of voluntary memory. It has the merit of being unexpected enough so that the child brings no pernicious habits of automatism to obscure the examiner's judgment.

The teacher has seven or eight cards, on each of which is pasted the picture of a familiar animal, a cow, a pig, an elephant, a rabbit, a horse, a camel, a bear, a cat. Silhouettes may be used if the outline is made unmistakable. These cards she arranges in any order on the table, and tells the child to look at them until he knows them. She then mixes them up, and asks the child to put them back in the same order as before. If he cannot manage eight correctly, try seven, or six, or four, until he shows his average capacity. When he has put the cards down in the order he thinks to be right, the teacher asks him if he is sure he has the

order straight. If he is sure, it is an indication that he has tried to form associations about the placing of the animals, whether successfully or not, but if he is uncertain, it is apt to be because he depended on his automatic memory. Conscious thought always carries with it an element of positiveness, whereas the mechanical mental process usually cannot withstand a challenge.

If a child does very poorly in this test of voluntary memory, he must not be condemned, for, as we have said, he may be simply overworking another faculty. The examiner will notice, without hurrying him, whether he takes a long or a short time to learn the row of animals, and having learned them, how successful he is in getting the order right. She will notice whether he only attempts a few and gets them right, or whether he tries for the whole eight and puts them down inaccurately. And finally she will compare his showing in the two tests of automatic and voluntary memory, to determine which is better developed. It some-

times happens that a child with a poor automatic memory has painfully goaded his voluntary memory into some sort of action, and in that case the training should begin with the simpler and more fundamental faculty. But in the majority of children who show any memory defect, the voluntary memory is stagnant, and the training here suggested will be found effective in starting the currents.

The first principle in the training of voluntary memory is to make a habit of forming associations. It is of no use to pour in information, to create new associative material unless the child can use to some purpose the material he already has. And so we will not set him to learning poetry or prose, and we will not, for this purpose, tell him stories about strange things and places, to see how much he can remember. But we will tell him to make some verses of his own. It does not matter whether they have any rhythm or not. Explain the idea of rhyming, so as to make a goal for

his invention, and let him dig out rhymes about anything that comes into his head. Cats and babies seem to be prolific subjects, especially for girls. The verse need not be of any stated length, but just as long as the child sees fit. The utmost assistance or direction that the teacher should give is general conversation about the subject, bearing in mind that the child's ideas, and not hers, are to be brought into play.

A girl of twelve, in a special class, and recommended for an ungraded class, wrote this rhyme in this way:

My Kitty gave me a scarch
I threw her a ball to catch
My Kitty is fond of ball
She likes to walk in the hall
My Kitty likes to sit down
She runs all over the town
My Kitty playes with the mice
My kitty is nice
She went out in the night
My Kitty can fight.

It took a good while, perhaps three quarters of an hour, to work it out by herself,

but her ideas, however slowly they came, seemed to pour out endlessly. The idea of "kitty" suggested "scratch" right away, because she had apparently just had an encounter with a cat. Then came a long pause at the double difficulty of a new idea, and one that would rhyme. In Julia's production each line is a complete idea, and has no real relation to any other, but in her mind some sort of relation did exist as this series of pictures, which we call ideas, passed laboriously into expression. Julia was thought to be hopeless in memory work, but here she had been working out associations, however inconsequential to any one else, which to her meant a coherent train. The day after she had written it, she learned it by heart in a short time. The mental effect was like the increased strength and more precise activity of a muscle. The search for associated ideas in making up the rhymes was as much an exercise, a contracting and relaxing if you will, of unused faculties as a fifteen-minute practice with dumbells to the

biceps. And having dug out these associations herself, when she came to memorise the lines, she found herself involuntarily memorising by the associations already established, rather than by the automatic process she would apply to some one's else ideas in a set piece.

Educators are confronted with a long curriculum and a short school period, and it is not surprising that under such conditions children's minds become enervated. Too much is given them and too little is asked of them. It is obviously much quicker to instil facts and trust to their being absorbed than to wait upon the slow unfolding of originality. We should appreciate, however, that the mind which would react must first be able to act. And presently it comes about that from writing his own verses, however meagre, a child comes to have some sort of a dim fellow-craftsman feeling for the other people who make verses. Especially this feeling is fostered if the verses he sees are about things written within his

range; if for instance he learns somebody's else rhyme about a kitty, he gets a notion, confused and inarticulate as may be, that there is another way of treating the subject than his. And having some active ideas about a kitty from his own efforts, he reads the new rhyme with reference to his own ideas, which are already awakened, and when he learns it, he tends to memorise, as we say, intelligently.

This is an account, briefly, of the effect of the training from within. To carry on the training, have the child make and learn his own rhymes on every conceivable subject; for instance, winter, summer, things to eat, music, the country, etc.; and as far as possible let him learn at the same time some existing piece on the same subject so that he will get into the habit of taking in the ideas he reads. The elaborateness of the verses given him must keep pace with the elaboration of his own ideas; if he is set to learning pieces with ideas beyond him, he will quickly slip back into the rote habit. All sound training is a

matter of starting habits of mind, and the principle in the present case is sufficiently clear. For the method, verse is suggested as a beginning, because of the obvious amusement of rhyme. It does not do, of course, to offer only the dry bones of training. But later, if memorising prose is for any reason more desirable, the same purpose is served.

III. It will be noticed that in the discussion of automatic and voluntary memory, acquiring has been the point and nothing has been said about retaining. The reason is that for purposes of analysis, retention is practically a separate faculty. It appears after examining a great many children that a good automatic or a good voluntary memory or both may exist independently of the retentive quality. A child may be able to repeat automatically a sentence he has heard or he may be able to give a complete account of Columbus's voyage which he has studied in his history book, but only while it is fresh. After a short time his recollection in either case becomes inaccurate or frag-

mentary. On the other hand, a child who makes a very poor showing at the immediate reproduction of ideas will be found to have embedded in his memory the few bits which did make an impression either in conscious or unconscious thought. And so it seems that retention is a faculty to be observed separately from the other factors in memory.

Retention furthermore is thought to be more largely physical than either automatic or voluntary reproduction. The evidence of a more complete physical basis lies in the results of training. An under-nourished child, for instance, responds to a stimulation of his automatic or voluntary memory and shows an improvement quite surprising in view of his physical condition; but it is very rarely that he shows at the same time any marked improvement in retention. Let him be built up physically, however, and the duration of his memory will seem quite out of proportion to his progress in other ways. This simple case of under-nourishment is the most direct evidence of the physical basis

of retention which is apt to come in the teacher's way. For the rest, the quality of brain substance, which only partly determines automatic memory, is at the root of retentive memory. "Like wax to receive, like marble to retain," we say, and the figure hits close to the mark. For we have to imagine this brain substance to be different from any material we know, having at the same time plasticity and solidity, the qualities of wax and marble in one.

In establishing facts about the mind the observations made in brain disease confirm the slighter evidence drawn from normal working. At least, if we observe a certain faculty in health and in disease and see that certain factors are constant, whatever the other changes, we can be fairly certain of the inferences. In diseases of memory, it appears that it is chiefly the retentive faculty which is lost. The person can begin all over again, save in cases of senility, and use his automatic or voluntary memory quite unimpaired. But a whole lifetime may have

dropped out of his recollection, and perhaps he will have trouble in retaining even his new knowledge. In cases of senility or of simple old age, the marblelike quality of the brain substance seems to go, along with its plasticity, leaving it in a condition which can figuratively be called brittle. And the effect is that old people are neither very impressionable, nor are their impressions lasting. Only the old ideas, rooted and embedded in associations, survive.

And so we separate retention from the other factors of memory because its own excellence does not appear to depend on the excellence of these other factors, and because we judge retention to be largely a physical quality. And we infer its physical basis from the immediate effect of improved nourishment (whether by more food or by better assimilation of the existing diet) and from its uniform absence in diseases of memory. Neither nourishment nor disease, on the other hand, affects so directly the workings of the other two kinds of memory, automatic and voluntary.

This quality of retention is discussed to give a more complete account of memory in its various phases. In experience however, the quality of retention is rarely found to need special training, or indeed to be especially responsive to it. That is to say, if a child who knows his history or geography lesson to-day has forgotten it to-morrow, the fault is probably that his voluntary memory is poor or untrained and that he is overworking his automatic memory. If his retentive faculty as such were at fault, he would not have been able to learn the lesson in the first place. Forgetfulness must not be confused with poor retention. Retention depends on the degree of impressibility of the brain-cells and forgetfulness depends on the strength or weakness of the impression. A simple matter of forgetfulness in school children, therefore, is to be helped by making the impressions stronger, that is, by awakening and multiplying associations. So that training in automatic and voluntary memory is the most

direct way of remedying the ordinary forgetfulness.

But when the impressibility of the brain cells apart from the strength or weakness of the impressions is defective, the person is either an imbecile of high grade, in which case defective retention is only one of a number of symptoms; or he suffers from disease of memory; or his physical condition is far below par. Any one of these cases is not for the teacher to handle. If it comes under her observation she can refer it to one of the proper agencies, but it is useless to try and deal with defective retention in the schoolroom alone.

With this analysis of memory the teacher is in a better position to distinguish specifically between the different types of attention and memory.

Attention works as	Memory works as
1. Simultaneous, or all at one time.	1. Automatic, or reproducing successive disconnected impressions over an indefinite time.
2. Homogeneous, or all on one thing.	2. Voluntary, or reproducing a complexity of ideas over an indefinite time.

3. Disparate, or on two things at one time.	3. Retentive, or holding ideas over an indefinite time.

The time element differentiates simultaneous attention from automatic memory; on the one hand is the reproduction of an impression which is received at one time like the sight of a picture; and on the other the reproduction of successive impressions, like a column of figures. In common they have the absence of conscious thought.

Homogeneous attention and voluntary memory are even less likely to be confused. In common they both demand conscious thought at the outset, homogeneous attention in sharply focusing the object to be attended to, like the search for a particular kind of tree in a number of pictures, and voluntary memory in calling up associations to make a setting for a new idea. But beyond the element of consciousness they are widely different in function. Voluntary memory is concerned with the manipulation of associations, while homogeneous attention in pursuit of a single object in the focus of consciousness

is as divorced from association processes as one mental faculty can be independent of another.

Retentive memory is of all three types the most dependent upon the quality of attention, as shown in its simultaneous, homogeneous, and disparate workings. But it is not to be confused with any one of them, because its essential function is a call upon past ideas, whereas storing up is no part of the functions of attention.

CHAPTER VI

THE MENTAL RÔLE OF SENSATION

A PERSON'S sensations play upon his thoughts as the overtones of a musical sound play upon the pure notes. He is perhaps scarcely conscious of their unending procession, except when they bring him a pain or a decided pleasure. And yet these sensations of colour, of sound, of touch, of taste, which in the beginning opened the whole external world to the child, later persist as a background of warmth and vitality to all his intellectual life.

The mental rôle of the senses offers an inquiry quite distinct, and far more subtle than an investigation into the physical excellence of the sense organs. When one realises that many deaf people are musically very keen, and that many blind people

continue to think vividly in terms of colour, it is plain that mental sensitivity is a quality by itself and not wholly dependent on retina, tympanum, and nerve tracts. The range of mental sensitivity, furthermore, is much wider than the range of physical sensitiveness; in ten people, for instance, whose vision and hearing would prove by test to be approximately the same, one would find the greatest possible difference of vividness in the rôles played by colour and sound. And so, in making the sensation tests in an examination of this present kind, one should know in advance from a specialist's report whether the child suffers from defective sense organs, near-sightedness, deafness, and so on. If he does, the defect may handicap him in his school work, but it does not necessarily neutralise the value of the sensation tests; if he is normal, on the other hand, it does not mean that he is also normally sensitive to all the impressions that come through his physical sense organs. In other words, the sensation tests which will pre-

sently be described are to determine, first, the keenness of colour sense, sound discrimination, touch, taste, and smell discrimination; and second, especially in the case of colour and sound, to determine the respective importance of the mental rôles played by these sensations. These tests are intended for children over eight years old, for before that age, before sensations have become much interwoven with other mental processes, the examination would be hardly more than a physical one.

Comparatively few children are colour-blind; but nevertheless one finds a great many who are hazy in distinguishing between certain shades of blue and green, for instance, and who make one decision at one moment and another at the next. A bunch of coloured worsteds can be used, with ten or fifteen different reds, shading gradually into yellow at one end and purple at the other, and so on through all the colours. There should be many tones of all colours, so that when the child is told to sort all the

yellows or all the blues, he will have to use a nice discrimination in deciding where one colour leaves off and another begins.

This test, commonly used for trying the colour sense of railway engineers, besides revealing any possible colour-blindness, goes farther and gives an indication of how sensitive a person is to colour, and by corollary how important a part colour is apt to play in his impressions, his memory, and so on. A certain shade of blue strikes the retina with an invariable number of light vibrations, and another shade of blue strikes it with a different number, always in fixed ratio to the first. But whether this mathematical difference is actually perceived in the mind is the whole question of mental sensitivity. Some children, for instance, whose accepted idea of blue is a kind of ultramarine, will pick out the two or three shades in the neighbourhood of ultramarine, and refuse all the others. Such a child is not colour-blind, nor indeed can one say that his sense of colour is actually defective, but it is not

likely that he notices colours very much, or that one can enliven his intellectual processes very much by means of colour suggestions. On the other hand, a nice discrimination in colour indicates a vividness of colour impressions, a certain appeal and a possible storing up of colour images which is a valuable point of departure in training.

It must be remembered that to most children, especially in the public schools, "light green" and "dark green," or "light blue" and "dark blue," are as much two separate colours as pink and red. So that when the examiner asks the child to pick out all the shades of a certain colour, she should say "all the light reds and all the dark reds," or whatever the colour may be.

Most people show an uneven development in their sound and colour senses, and the practical point of the test is to compare the two. And so, having discovered how distinctly the child realises his colour images, we will determine his sound sensitivity by equally simple means. When it is possible

to have a piano for sound tests, it is better to use it; otherwise any instrument with a range of several notes, or as a last resort, the voice, will serve as a rough device. But supposing a piano to be convenient, the examiner strikes one note, for instance middle C, and after an interval, another next to it, asking the child whether the first note is higher or lower than the second or the same. Practically all children over nine years old know the scale, and know when it goes up and when it goes down, but if the child in question should be doubtful for any reason, the test can be made by asking whether the second note is the same or different from the first. Then strike several notes together, either in a chord or a discord, and ask the child how many different sounds he can pick out. Meanwhile the child is to look away from the piano, so that what he sees will not influence his sound discrimination.

If these tests seem to call for a less nice discrimination than the colour test, it must

be remembered that our sound sensitivity is relatively a recent development in the race; street boys of to-day whistle with a correctness of ear which was the peculiar gift of a few musicians two hundred years ago; but although there is no common unit to measure colour and sound sensitivity, the latter in the average person is still gross in comparison with the fine discrimination of the eye. And therefore, to be fair, we must make our sound tests more rough and ready than our colour tests.

It is scarcely possible to put down in exact terms the result of either of these foregoing tests. In a general way one must notice whether the child tends to be dull or inaccurate. In sorting the colours if he admits only two or three shades of the colour required, his sense is dull, but if he spreads over into neighbouring colours, grouping with blue several shades that are strictly green, or purple, his discrimination is ill-balanced. In the same way, if he hears two simultaneous notes on the piano as one, he

is dull of hearing, but if he hears them as four, he is ill-balanced. It is worth while noticing whether dulness in the one sense corresponds to dulness or inaccuracy in the other, or, indeed, whether dulness or inaccuracy in the one case is compensated by keenness in the other. Children over ten frequently meet all the requirements of these tests with perfect ease, and they are to be accounted, not as prodigies, but as likely to respond favourably to training devices based on sensation.

More difficult and much more indefinite, however, is the discovery of which sense plays the more important mental rôle, and how important that rôle is. Or, as we commonly say, is the child visual-minded or ear-minded? The answer to this question has its most direct bearing on the subject of spelling. When we know whether sights or sounds make the readier and clearer impression on the child's mind, we shall know whether to teach him spelling phonetically or by visualising, and we shall not waste

time on approaches to which he is insensible. But besides this immediate schoolroom application, the question of visual- or ear-mindedness has its effect on the reporting of impressions, the accrediting of testimony, the formation of personal tastes, and so on into a thousand ramifications. The examiner is concerned to find out whether visual- or ear-mindedness predominates; how pronounced is that predominance; and whether it corresponds to the greater keenness in discrimination of colour or sound which may have been exhibited.

Unfortunately the child is not prepared to index his impressions; and the examiner therefore can only go about her present business in the most roundabout way. Could one be sure of a lively response, the ideal way to determine ear- or visual-mindedness would be to have a child tell a story, and notice whether sights or sounds prevailed in his recollection. But this would presuppose an almost literary sense of the value of impressions, whereas the average child

is chained to a recital of the baldest facts. And so, while it is sometimes worth trying, story-telling is so often unsatisfactory that other ways are suggested, always on the principle of getting at a mental fact so indirectly that the person questioned does not know what is wanted.

Ask the child for instance what he likes best about a hand-organ, or if he seems especially intelligent, ask him what he thinks of first when he thinks of a hand-organ. Some will say "monkey," some "dancing," some will begin to hum "The Wearing of the Green," or perhaps say "nice music," and so on. If he does not seem to understand the question, the examiner can help him by saying, "When you think of a hand-organ, do you think of the man and the monkey first, or do you think of the music?" Even with this direction, the child's predisposition will come out in the course of a number of questions; but children are so quick to answer what they think is wanted, that the examiner must be very careful not to show any bias.

The questions asked must be of a sort to call up images which combine seeing and hearing so that the examiner may get an idea which of two equally possible impressions is the stronger. To ask a child, for instance, what is his first idea of a blackboard is not a good way to bring out the preponderance of visual or auditory impressions, because although an extremely ear-minded child might say that the squeak of the chalk was his first thought of a blackboard, the usual impression of a blackboard to everybody is largely visual. But a moving picture show with its invariable hammering of music combines sensations of sight and sound, or a church service, or a building going up, or an elevated train, or anything familiar to the child that offers both visual and auditory stimuli. The question must not concern action on the child's part, like playing a game, or a day in the country, because what he himself did is of course more vivid to a child than his sense impressions while he was doing it.

The reader will have no difficulty in realising that while in physical examinations one can measure with exactness the range of hearing, the degree of astigmatism, and so on, in making psychological tests it is the comparative keenness, the relative importance of one sensation against another which one wishes to discover.

When the examiner has made this determination in regard to the sensations of sight and sound, she knows those facts about the child's sensitivity to impressions which will be most practical in training him. But to make a complete examination, to have a really comprehensive notion of the child as a whole, she should also know something of his keenness in the less intellectual sensations, touch, taste, and smell.

The sense of touch is an undercurrent which seldom comes to the surface of consciousness in the daily lives of most people, but like sight and hearing it is to be tested for discrimination and for the importance of its mental rôle. The nerve-endings which

are sensitive to touch are unequally distributed over the body, and are most frequent at the back of the neck and on the palm of the hand. A simple instrument for testing this frequency of tactile nerve-endings is a pair of dividers, which should be fixed with its two points half an inch apart. Do not let the child see the compass, but touch him lightly on the back of the neck with both points at once, and ask him how many points he feels. If he says "one," increase the distance between the points until he feels both. Or if, at half an inch, he feels two points, decrease the distance until he feels only one. Then try the same thing on the palm of the hand. Half an inch is approximately a normal distance for feeling two points as one; if the child can distinguish two points at less than half an inch, his tactile nerve-endings are unusually frequent, and his touch discrimination is keen; but on the other hand, if at more than half an inch he still feels the two points as one, his sense of touch is dull.

The mental rôle of tactile sensations can be gauged with a good deal of certainty by using various materials of different surfaces. With closed eyes, the child is to feel and stroke such surfaces as velvet, wood, satin, sandpaper, and so on. He is to name each one if he can, or at least to describe how it feels; and if he has a keen sense of touch, he will have noticed in the natural course of his life how things feel, so that it will be apparent to the examiner, even without an accurate naming of the materials, that here is part of the makings of his daily impressions. Fabrics of different sorts may be used, or if they seem to call for too subtle discrimination, and the child is bewildered, try sandpaper, wood, coal, and other less refined stimuli. The examiner must be sure that it is the tactile sense and not invention that she is testing. She should give some of the tests a second time, for instance, repeating sandpaper after wood and cotton, and ask the child if he has felt that before. Especially must she be careful to keep the test as free

as possible of suggestion from herself, for nowhere will a person deceive himself and consequently his audience so readily as in the department of sensation.

A keen sense of touch, to discriminate between velvet and heavy satin when neither has been seen, is not very common among school children. Sandpaper and the split side of a piece of wood are also often confounded without indicating anything abnormal. In fact, a dull sense of touch is so usual as to be not particularly significant, except in conjunction with an abnormal dulness of all the senses. Rather will the examiner make note of an especial keenness in the tactile sense as a basis for future training.

In testing smell, if one wishes to get a fair idea of that sense alone, it is just as important as in hearing and touch to blindfold the child, or in some way prevent him from seeing the materials of the tests. With closed eyes, therefore, have him smell as many odours as are familiar to him—such as coffee, garlic,

any kind of perfume, oranges, and so on. Let him name these familiar smells, again for the purpose of determining how much attention he naturally pays to smell. But for physical smell discrimination, let him smell various kinds of spices without concerning himself about their names to see if he can distinguish between them. Give him cinnamon, cloves, balsam, and nutmeg in different orders, telling him, for instance, to say every time when he smells cloves. A more refined test is to ask him if allspice and cinnamon are the same or different.

Taste as we commonly know it is made up largely of smells, so that to test taste as a separate sense is simply a matter of testing the four primary sensations, sweet, salt, bitter, and acid. A sense of taste shows little variation from person to person and the test is made by asking for the differentiation and identification of the four primary tastes.

The value of sense training, and the importance of beginning it very young, was emphasised first by Froebel and all succeed-

ing kindergartners, and lately by Madame Montessori in her Casa Bambini. It would, of course, be a valuable stimulus if all the senses were trained from early childhood, since the more vivid a person's impressions are, the more readily can they be co-ordinated in the proper intellectual processes. If I am keenly aware of the colour of things, if I am sensitive to different sounds, if I notice how things feel—I have, from the teacher's point of view, just so many more pegs on which to hang various facts and ideas which would otherwise sink down among the dry bones of memory. But the present question is to diagnose children whose early training is an accomplished fact, and an accomplishment unfortunately in which the senses have too often been ignored. The examiner therefore has reason to expect a uniform greyness from the foregoing tests. Yet she will find that she can distinguish between mere physical sensitivity and the ideas and images with which the senses fertilise the mind.

Nevertheless, valuable as sense training is at the beginning of education, after the age of seven it loses in effect when it is given as an end in itself. For as associations multiply and become more and more the warp and woof of a child's mind, so does the mental rôle of sensation tend to take the place of merely physical keenness, and the value of sense training comes to lie in its stimulation of other faculties. We may teach the alphabet to a child of four or five by sandpaper letters, according to the Montessori method, and his notions of A, of S, of W, and so on will be much more sharply differentiated than those of the average child, because he has not only grasped their personalities visually, but by touch as well. And thus far the direct sense-training has produced its due effect.

But take the case of a child of eleven who cannot learn his alphabet. We shall only waste time if we begin at the beginning and try to stimulate all his senses; but if we use what keenness of sensation he has, and base

our training on the sensation which seems to appeal to him most, the object is accomplished. Suppose, for instance, that the child is ear-minded and shows a fairly keen sound-discrimination, or even simply a fondness for music. We can teach him the alphabet by printing the letters on the white keys of the piano, and as previously described, by teaching him tunes, establish the association of a certain note with each letter. Here we are not training his auditory sense directly, but we are using it as a background for the associations we wish to create; incidentally the auditory sense will be stimulated, but primarily it serves to multiply the associations about each letter, and so make a more lasting impression on the mind.

And so it is throughout education after intellectual training begins; the appeal to the senses becomes an appeal to the development of mental sensitivity. Sensations, which are the first mental life of a baby, later become so involved with all his intellectual processes that after a while it is only through

the associative, ideational side of sensation that we can affect the other workings of his mind. And consequently, in a school child over seven years old, when we wish to remedy some defect either of nature or training, we do not try to deal with his sensations alone, but taking his colour sense, his sound discrimination, his tactile sense, and his senses of taste and smell as so much given material, we try to multiply the rôles which these sensations play in his mind.

CHAPTER VII

INFLUENCE OF PERCEPTION

PERCEPTION is an over-worked word which we use to express our sense of intuitions, atmospheres, and all sorts of nebulous feelings. We speak commonly of a person who has fine or obtuse "perceptions," and what we mean by fine perceptions is a blend of sympathy, observation, experience, and quickness of thought which makes him sensitive to fine shades of feeling and the inner meanings of things. But in the strictly technical sense, perception has no such latitude; it is, on the contrary, closely defined and limited. Intellectual perception is the cast of mind in which we receive impressions. When I speak to you of sensation, I am talking about the raw material of ideas; when I discuss attention and mem-

ory, I am speaking of the way you dispose of ideas after they are formed; but when I ask you to consider perception, I ask you to consider ideas in the very process of formation.

Let us take any idea which is more complex than a simple mental image—let us take, for example, the idea of a person falling from a second-story window. It is clear that certain visual, auditory, tactile images —what is known as the complex of sensations—give us our material for the mental picture, and that its details are suggested from the storehouse of memory. A fat middle-aged woman, let us say, is leaning against the frame of an open window. She is not looking out, but suddenly a hubbub breaks out directly underneath the window. She looks out in curiosity, and thinking she hears her little boy's voice, she leans far out in order to see, loses her balance, and, as the window-sill is low, out she goes. It happens that her skirt catches on a projecting cornice, and breaks her fall, so that she lands on the street a good deal bruised

and shaken, but able to pick herself up. As soon as bystanders realise that she is not much hurt, they begin to smile—she is so tumbled and fat and red in the face—her bruises serve to loosen her tongue, and she scolds the boy who indirectly made her fall.

Now it is clear that, as we consider this hypothetical case, our points of view will differ. Some of us will form our idea of the incident from the standpoint of what caused the fall, and our attention will be attracted by what happened up to the point when she overbalanced; others, however, will take the idea of the fall simply as the beginning of the ensuing incidents and will be impressed chiefly by the bruises, the laughing, the scolding, and so on. In other words, we shall find ourselves entertaining the idea of the fall, either as the result of certain causes or as the prelude to certain effects.

These two points of view are the two moulds into which our intellectual perceptions are cast. Quite independently of the colouring and direction which accident, association,

and a hundred idiosyncrasies may give, an impression, once it has passed beyond simple sensation, comes in some kind of relation to other impressions. This relation is either analytic or synthetic. If the main impression, like the fall out of the window, relates itself to the incidents that have gone before—that is, if this main impression is taken as a whole, with a number of parts which go to make it up, we say that our perception of that idea is analytic. In analytic perception, we accept an impression first as a whole, and then take it to pieces, analyse it, seek its relation to what has already happened.

If, however, the main impression, this same fall out of the window, for example, relates itself at once to the incidents that come after, if it is taken simply as a cue leading up to a completed idea which in this case may be the consequences to women when they fall out of windows, we say our perception of that idea is synthetic. When we synthesise we gather up the idea that is first presented to us, together with others

related to it, like the initial idea of the fall and the incidents that followed, and pursue it to the end of the story.

Put briefly, if we tend to look into a thing, we perceive it analytically, but if we accept it as it stands, and tend to follow it up, we perceive it synthetically.

Most people incline toward either an analytic or a synthetic turn of mind. They are not conscious of it perhaps, but this difference in the way an idea is formed affects at once the person's own reaction to that idea. In the situations of everyday life, the practical difference between analytic and synthetic perception is very plain. The synthetically minded person is apt to be more observing, because he is accustomed to think in details, and especially in the concrete details which lead to some definite conclusion. And as he goes about he will see signals here and there which he reads in terms of what they will result in. If he sees a banana peel on the street, it suggests slipping and perhaps falling down, and he

avoids it; but the analytically minded person, if he thinks about the banana peel at all, will be more apt to think of bananas in general, and tropical countries, rather than upon any especial bearing of this particular banana peel. And the analytically minded person will be a great deal more apt to slip on the banana peel from the very fact that his ideas, in the process of formation, are perceived in the large rather than in detail.

Indeed, the synthetically minded person has the advantage in many situations, and especially in emergencies where his habit of drawing his observations quickly to a conclusion stands him in good stead. One sees any day in the newspapers how an analytic or a synthetic habit of mind governs a man's narration of a personal adventure. Take him when he is off his guard, fresh from the exciting incidents of his experience, and see how his natural bent controls what he has to say about the causes and effects, or the very facts themselves, of what he has undergone. His reactions are untrammelled by his will

and you see his mind acting upon the facts of his adventure almost independently of intent or education.

Here is a sample narrative, taken from the New York *Sun* of October 4, 1912, the day following a railway wreck:

"Mr. Merry and I were seated in the smoking section of the second Pullman parlour car. We were reading when there came a sudden noise as of an explosion. The car began to bump over the ties and in a few seconds began to tip perceptibly and turned half-way over, throwing the chairs about and tossing the passengers in heaps on the side of the car.

"The car fetched up with a sudden jolt and Mr. Merry and myself, neither of whom was hurt, began at once to help the passengers from the car. The women were panic-stricken. With the help of the coloured porter and some of the trainmen we succeeded in getting all the passengers out of our coach."

The man who told the story of the wreck in so direct a fashion was clearly synthetically minded. Another survivor, in answer to the same question, "Can't you tell us some-

thing about the wreck?" went immediately to the causes. He said:

"It was a case of taking a switch too fast," said Mr. Turner. "The train was simply wrenched from the rails. After the crash I went to the help of my mother and got her out of the car. We broke open the rear door of the car and climbed to the ground. On the whole we got off easily, I think."

And here is the way a man told his story who tried to keep to strict narrative, but whose analytical mind led him into deductions:

"I was in the second coach," said Swan, "well toward the end of the train. We were crossing from one track to another, *and we were taking the crossover too fast.* The train jumped to the ties and then slid along the roadbed, coming to a stop with a grind. I saw where the engineer and fireman were thrown *and I suppose they died while I was looking at them.*"

We have been emphasising the distinction between these two types of perception for the sake of clearness. In point of fact, the average person cannot grow up without a

good deal of drilling in both forms of perception; for the common play of associations and experience will impress a thousand synthetic processes of thought upon us all, while talk, general information, and so on give us the results of analytic thinking. But a certain difference among people remains, a certain predisposing cast in this matter of perception which exercises as it were a subterranean influence among the more prominent factors of education.

Analysis and synthesis, besides their more far-reaching effects, are concerned in the daily schoolroom round. Some subjects call for the one form of perception and some for the other. Grammar, for instance, is an analytic subject; history and geography also are analytic where they cease to be mere memory; arithmetic is synthetic; any form of science is synthetic if it is taught by induction, that is, reasoning from particular cases to general facts, rather than as an effort of memory. Spelling is learned by analytic perception—that is, we must think from the

whole word to its parts, with much help, of course, from visual memory; while reading tends to be more a matter of synthesis. In composition, the teacher will notice that the child of analytical mind is apt to be more inventive, although perhaps less accurate, than he of synthetic perception.

Now, a child will show aptitude in this or that subject pretty nearly in accord with the nature of his perceptions. Teachers are familiar with the type of child who is good in history, English grammar, spelling, and so on, as against the child who is good in arithmetic and science. The difference is usually put down to difference in degree of imagination. It is not a question of degree, however, but of kind, and the synthetically minded child who takes to arithmetic and more exact subjects is also using his imagination, but using it in harness.

To classify subjects in this way is not to say that either analysis or synthesis is the only form of perception used in grasping them. The normal child uses both forms of percep-

tion, as he uses both hands, with, however, a slight balance in favour of one or the other. The subnormal child will be likely to show a more marked tendency in one direction or the other, since one cause of his subnormality is the upsetting of balances; and when the teacher has discovered whether his perceptions are analytic or synthetic she can put her explanation in the form which the particular child will most readily take in.

A predisposition toward analysis is tested by such questions as these:

1. Why are paper, sugar, and snow alike?
2. What is the difference between a lie and a mistake?
3. What is alike in your pencil, my chair, and the door?

The first question calls for an analysis of appearance. The mental process is to think of the prominent things about paper, sugar, and snow, and to seize upon the common factor, and the length of time it takes is determined by the child's predisposition to dissect his ideas. The examiner in asking

this question should be handling a piece of paper that is white so that the child may not be preoccupied with some notion of yellow or brown paper.

The second question is pretty abstract and calls for an examination of motive. It is usually better to illustrate such questions with concrete examples. And it should be noticed that in all abstract questions, including those of the type of the second, the examiner must not regard the correctness of the answer as much as the establishment of a real difference. The object is to discover the working of a child's mind, and not his opinions, which may or may not be conventional. If a child says, "A lie is when you make a mistake and a mistake ain't so," he is stating facts, but he is not making a difference. This is a very frequent answer to this question. If, however, he says, "I made a mistake but I didn't go for to lie," the examiner must be quick to see that underneath the vagueness of expression the child has pierced the difference. Whether

that perception affects his moral conduct is entirely another point.

The third question is similar to the first save that it involves material instead of appearance. The examiner will use many different questions on these lines, being careful not to group questions of the same type like (1) and (3) lest the child answer mechanically.

Another test of analysis is to give a word like *furniture* spelled out in separate letters—the letters of the ordinary word game will do—and ask the child to make three separate small words of it. *Fur*, of course, stands before his eyes if he will see it, *true* and *in* are others, or *run* and *tie*.

The similar test for the synthetic tendency is to give the child the letters of a word like *mother* or a shorter one like *cat* all in a jumble and ask him to find out what word they spell. Here he uses just the opposite process of thought, and instead of thinking, "What are the parts of this word?" he says to himself in effect, "What will this and this make, what will these come to?"

Another test of synthesis is to show the child pictures of common objects with some obvious part lacking, as for instance the picture of a cup without its handle, and ask him what is missing. This is of course a test of observation also, but it demands a synthetic process of thought, that is, thinking from the parts to the whole to find out what is lacking.

Some questions to bring out a possible synthetic turn of mind are these:

1. If you saw a horse and waggon standing, and the horse had no harness on, what would you think?

2. If you have a friend and he says to you, "Give me your knife for a week and then I'll give it back to you and give you a marble too," what would you do?

3. What is the difference between a man who runs looking back over his shoulder all the time and a man who runs looking straight ahead?

These questions can all be answered from both the synthetic and the analytic points of

view, but they are primarily synthetic, and the synthetic answers will be the more interesting ones. In the first, if the child speculates on why the horse had no harness, he is analytical, but if his answer is about what the horse would do without his harness, how he might run away or lie down or go upon the sidewalk, it is synthetical.

In the second question, the child who leans toward synthesis will calculate the outcome of the transaction, and what benefit the other boy will get out of it. He will be more on the lookout for traps because of his very mental habit of foreseeing consequences.

The third question illustrates very well the different reaction which an analytic or a synthetic turn of mind will produce. The analytic person wonders why the man was looking over his shoulder, and the synthetic person wonders what effect looking over his shoulder would have upon his running. So one child answers, "He was afraid," or, "He wanted to see," and another says, "It makes him run slower," or, "He runs into somebody."

The examiner will think of questions to fit the kind of children she is dealing with. She must devise such questions as will induce the child to follow out some chain of possible consequences, and encourage him to go as far as he can. The examiner must be careful not to ask such things as are a matter of common knowledge to the child, however synthetic the acquiring of such knowledge may have originally been. Such a question would be, "If it is raining hard and the window is open, what would happen?" The examiner must seek for questions that present a slightly unusual situation.

A rough and ready measure of comparative analysis or synthesis is what is called the part-wholes method. The examiner asks the child to name some part of a chair, a cow, a waggon, etc., and then asks him, "What is a window part of, what is a sleeve part of?" etc. The first calls for an analysis of wholes into parts, and the second for a synthesis of parts into a whole.

The examiner is making these tests not

for any absolute determination of ability, but to find out the child's inclination in one of two directions. The child may appear phenomenally dull in all of the tests, or he may do them all with ease; but the examiner is intent upon discovering whether he does the analytic or synthetic tests more readily, whether it is easier for him to split up into parts the word *furniture* or to build up from separate letters the word *mother*, and which type of question he answers with greater insight.

This determination being made, the results are for immediate application in the schoolroom. We are not holding a brief for either type of perception, but one wishes to find out in which form ideas are more readily grasped by the child. The ways of turning this cast of mind to practical account in teaching will be suggested in a later chapter.

CHAPTER VIII

ASSOCIATION CLUES

IN considering association processes, one can see very plainly the working of the fundamental law of psychology: that there can be no mental action without a previous brain action. The simplest laboratory tests will show that it takes an appreciable length of time for the registering of an idea and the associated reaction; in ordinary life we see how this time interval lessens with habit until the process seems instantaneous, and how fatigue or drugs or alcohol prolong it until even mechanical actions become laborious. It has been the great interest of modern psychologists to work out the physiology of association, especially in localising the association centres; and in the light of recent investigations we believe that a large part

of the cerebral hemispheres outside of the sensory and motor areas and the centres for speech and the special senses, is taken up with the registering of associations. Certain bundles of nerve fibres seem to be concerned with an automatic physiological process, the psychological law of which is this: that one part of an experience tends to revive other parts connected with it in time and place. So that if we hear a momentous piece of news in a certain room, the general appearance of the room will tend to be recalled whenever we think of that piece of news; and conversely, when we think of that room, or see a shade of blue, perhaps the colour of its curtains, we shall be likely to recall that news.

A particular association of this kind will persist until it becomes overlaid by repetitions or until some more recent and vivid association displaces it. As time goes on, associations multiply until it becomes very difficult for anyone, even the person himself, to tell what particular string among his whole

group of associations will be pulled by any given idea. We can plot out on paper what would be the normal associative processes in a given mental history, but we have no exact means of measuring the strength of the emotional factor in impressions, or the degree of retentive memory which is bound to affect associations; nor can we tell how much the purely physical states of the body have determined the impressibility of the association centres.

It is readily seen that association and associative memory are the basis of all intellectual life, and that to determine the peculiar grooves in which a person's associations are likely to run is to lay bare his secret places. The presence of the indeterminate factors, such as emotion, has given rise to the widely discussed association tests.

These tests are generally limited to tagging the associations about a certain event in order to discover what connection the person under examination had with that event. Notably, with supposed criminals associa-

tion tests have been made on the theory that a guilty conscience, or in other words the emotional factor, would so distort the normal automatic association processes as to be noticeable to the examiner. In Münsterberg's famous example, the criminal commits his murder in a room where there chances to be a canary bird. The examiner, who knows the circumstances, says to him a number of words, some of which are neutral and some of which are purposely inserted danger-words, and to each word he must reply with the first word that comes into his head. Among these danger-words is "yellow." Now, upon hearing "yellow," the criminal will do one of two things. Either he will pause perceptibly and find a non-committal reaction word like "blue," or "sun," or he will rush headlong into self-betrayal, and say "canary," which is undoubtedly his most vivid and recent association with "yellow." Thus, argues Professor Münsterberg, if he is guilty he is bound to incriminate himself in either case; he lengthens his normal association

time by showing an emotional disturbance, or if he does not see the trap, he discloses the actual history of his thought processes.

Such is a very interesting application of laboratory results to practical life. But if, instead of probing a certain history, we wish to get an insight into a person's mental make-up, we must pick our test words more or less at random, and according to the subtlety of our own psychological understanding make our judgment.

The difficulty of discovering association habits in a child is much greater than in a grown person. To a man or woman the examiner says: "When I say to you 'dog,' please answer at once the first word, whatever it is, that occurs to you." And the answer may be "bite," or "bark," or "cat," or "yellow," determined, perhaps, by a recent experience, but also by ingrained mental habits, and in the course of fifty or one hundred words, these mental habits stand pretty well revealed to the skilled psychologist. But a child's trains of thought

are in formation and he is deeply impressed with the teacher's constant demand for definition. So that if one calls on a child to react to "dog," he will probably say "animal," defining it, and so on through the list, because the machinery of thought formation is just now stronger in him than the matter of the thoughts themselves. It has seemed, after a great many attempts to test a school child's associations by the accepted method, that the best way to get a mental fact is to get at it indirectly so that the person, and especially the child, does not know what is wanted.

Ask the child then to write down twenty words, common words, such as he uses every day, like "house" and "school" and "pencil." Tell him that the spelling doesn't make any difference, or he may mistake your object and limit himself to the words he knows he can spell correctly. The length of the list and whether it shall be written or spoken must be determined in the individual case by the examiner, who will keep in mind that the

point is to get from the child a spontaneous sequence of ideas and that his train of thought must not be forced beyond its natural length. In children of fourteen and over it is often possible to try the direct association tests also, but the most reliable indication is to have him make his own list. Another device is to take the child's own list and get his reactions on the words he himself has written.

As original lists the following two are representative:

House, class, name, man, teacher, school, roof, Mary, Mrs., Tom, Frank, Joseph, Fannie, mother, father, grandfather, grandmother, sister, brother, Annie, chair, table, baby, pony, wind, spin, grin, all, call, fall, old, cold, fold, Millie, Biagio.

These words were written down by a girl of twelve, thought to be a mental defective, but in point of fact a moral delinquent. She was asked for twenty words, but she wrote thirty-five before she stopped to count.

Another list, made by a boy of thirteen, who was generally backward, is this:

Horse, stable, house, table, butter, eggs, bread, book, school, pen, letter, box, salt, battleship, city, country.

It is manifestly impossible to discover in such lists why each word led to the next; why, for instance, "box" suggested "salt," although we may guess at the spilling of a box of salt in the kitchen that day. But there are a few broad types of associations which present themselves for notice.

Verbal association—that is, association by the sound rather than the meaning of a word—is apt to be contrasted with objective association, or the linking of words that inherently belong together.

Continuity of association is opposed to group association—that is, a continuous chain of words each calling up the next is characteristic of a type of mind quite different from the one that thinks in groups of things, the groups, perhaps, being quite unrelated.

The examiner looks also for the degree of rapidity, ease, and monotony of the associations. These three qualities may all

exist together, or the associations may be rapid without being easy, or easy without being monotonous.

To illustrate: The first list quoted was rapid, but jerky rather than easy, and somewhat monotonous in the recurrence of names. It is verbal rather than objective, and is in groups rather than continuous.

The second list was slow, but fairly easy, and not at all monotonous. It is objective rather than verbal; it also is in groups rather than continuous.

Farther than this in drawing conclusions from a child's associations, it is hazardous to go. If we can find out whether he is disposed to recall things by the sound of their names (verbal), or by the idea he has of their meanings (objective); whether he thinks in a straight line (continuous), as it were, or whether his recollections are in closed circles which do not touch (group), or whether his thought processes are completely unclassifiable, we will have established a basis for his future training.

In making deductions from the first list, consider the fluency of the associations. Thirty-five detached words is a good many for a child to write down without pausing, and the indication is that what mental material she has is ready to hand. When, however, this readiness is joined to monotony and to a verbal type of association, the examiner may look for some form of slight hysteria. This hysteria, as will be shown in a later chapter, is not the screaming, convulsive state which is usually meant by the word, but a less acute condition which may be either positive or negative, and which indirectly affects both the moral and intellectual behaviour of the child. Should this list of thirty-five words have been objective, for instance, instead of verbal, and equally long and rapid, it would have shown definiteness in the grasp of ideas and a very complete identification of the idea with its symbol, the word. To have written so many words without stopping would have shown a well developed imagination, if the list had been objective and

fairly continuous. Had it been objective and jerky, perhaps in groups, the inference would have been a somewhat unbalanced imagination. But the monotony and verbal character, joined to the length and rapidity of production, marked this particular list as symptomatic of hysteria. The girl in this case appeared at the examination perfectly quiet and rather docile, and the deductions to be made from the evidence of hysteria in her association tests were as follows:

She was complained of for backwardness in lessons; the hysteria might therefore have been supposed to affect her intellectual faculties. But she used her memory, attention, perception, and so on normally; consequently the hysteria acted in a more indirect way, and by keeping her imagination in a feverish although not fertile condition it touched with morbidness the volitional side of her nature, that is her desires, her plans, her conduct. Such children usually have an overwrought dramatic instinct, and it ap-

peared markedly so in the case of this girl when she was asked to tell a story.

The result of this hysteria was in stealing, in lying, and thoroughgoing moral delinquency. The reason, however, that the complaint was of backwardness in lessons was this: Her intellectual faculties at the age of twelve were sufficiently unimpaired for her to conceal her wrongdoings. But her persistence in gratifying her morbid desires affected her physically, and of course affected her attitude toward everything that did not appeal to her love of excitement. In school, therefore, she was dull and listless to the point of making her teacher think her defective. The indication of hysteria, and its possible effect considering the soundness of her purely intellectual faculties, was put before her teacher. She was watched and found in various delinquencies. Instead, therefore, of being put in a class for mental defectives, where her tendencies would only have increased, she was promoted and received the train-

ing for hysteria explained in a later chapter.

In the second case, the list of the boy of thirteen who was generally backward, nothing abnormal was to be deduced. The list showed a plodding sort of mind, slow, but, from its objective character, rather thorough. His associations were not very ready, since he stopped after sixteen words; but they were fairly continuous, showing the very reverse of an hysterical condition. It was useless, therefore, to teach this boy through his imagination, or to count on what he would retain of general information. He must be taught point by point, and if the rest of the examination discloses any peculiar tendency or ability, the plodding character of his association test shows that it could be highly developed.

The examiner is warned against making too prolific and far-fetched deductions from association tests. Standing alone, they are almost valueless; we can only say if such and such other things are so, then a certain

association trait indicates thus and so, always contingently. But standing with the rest of the examination the association test is an indispensable weather-vane.

CHAPTER IX

ABSTRACTION AND ARITHMETIC

ABSTRACTION is the faculty of translating sensations into ideas. This faculty under analysis is found to work in three stages: the mental sensation excited by an outside stimulus, like the sight of a friend; the idea which depends on that stimulus, like the idea we have of that particular friend; and lastly the abstract idea pure and simple, like the conception of friends in general, which comes to be produced and developed without any outside stimulus at all. Or, to take a different sort of mental process, if I see a pile of four apples, and some one adds three more, I as a small child count them and the direct information conveyed is seven. At first seven means nothing to me but increase. Pre-

sently, however, I get a more definite idea that four and three together make seven, so that I can count the apples "1, 2, 3, 4," and then "1, 2, 3," and tell you that altogether there are seven. Finally, you can say to me without any apples, "How many are four and three?" and I will answer, "Seven."

The mathematical process is perhaps the clearest for illustration. The faculty of abstraction leads finally to ideas of ideas, to a general notion which is the outcome of many particular experiences. Thus the idea of right and wrong, starting at first with the pain of wrongdoing, elaborates into an idea that influences our actions and our very thoughts often with no causes or consequences but other ideas. And the novelist's creation of a character is the triumph of a process of abstraction which began in his infancy by translating the sensations excited by his mother into an idea of her personality.

This process of abstraction may seem too familiar and matter-of-course for analysis. The reason for making it, however, lies in the

hitch that is often to be observed in school children between the two last stages that have been described. It is hard for many children to cast aside the concrete helps with which they first form their ideas, and depend upon abstractions alone. And nowhere has the teacher more trouble in this respect than in arithmetic. The first two steps are easy; the child very readily gets to the point where he can do his sums if he has something to count from—his fingers if nothing better offers. Especially difficult in the case of faulty abstraction is the forming of an independent idea of addition, subtraction, multiplication, and division. The child confuses addition and multiplication, subtraction and division, and sometimes even addition and subtraction. The reason is that he still needs actually to see an increase to give him the idea of addition, and a lessening for the idea of subtraction. He must have visual and perhaps tactile proof that multiplication is a short cut of addition, and so on. We teach children these things

concretely at first, but in many cases we drop the intermediate stage before the child has completed his own abstraction process.

Difficulty with arithmetic may have a number of causes; and to discover if the trouble be faulty abstraction, the following tests may be used.

Give a very easy sum in mental arithmetic, pausing at each step, as for instance: "3, add 2. Take away 1. Multiply by 2. Add 3. Add 1. Divide by 3." At first the child should give the answer to each step as he goes along; after that he should do it all in his head and give only the final answer. This test will show how sound is his abstraction of the mathematical process. To test his abstract number sense ask him such a question as: "If I think of a number and adding 3 get 12, what is that number?"—the difficulty varying according to the individual child. In answering such a question he is thrown entirely upon his resources in abstracting the idea of number from counting. It is important

for the teacher to know whether the child's mistakes in his sums come from poor number sense or from an imperfect grasp of the mathematical processes.

Very faulty abstraction is one of the signs of a mental defective, but here again the examiner must judge this faculty by the rest of the tests, and not condemn him on the evidence of this faculty alone, for it is a weakness that often goes with a good deal of ability in other directions. Mathematical abstraction is the usual type of abstraction to show weakness without actual defect. The writer has never seen faulty abstraction in any other type except in the case of idiots.

The training of the abstraction process is largely the repetition of the training which one gives to a small child. He must learn to form at first very simple abstract ideas which shall be quite independent of concrete things. Bundles of coloured sticks may be used in teaching the functions of addition, subtraction, and so forth, so that the child may get a clear visual impression of the difference

between increasing and lessening. Then, when the sticks are taken away, the simplest numbers must be used so that he shall not be confused with figuring, when his whole attention must be given to the process. Let him at first add 1 and take away 1, multiply by 2 and divide by 2, that he may be quite sure of what he is doing with these functions.

If it is poor number sense that the child shows, the best possible training is mental arithmetic drill beginning with such easy sums that he cannot fail to get them right. In all abstraction training it is a principle to have the tasks easy enough for the child's ideas to be clear and his self-confidence increased. We are not now trying to supply him with information, but to teach him to use his mind, and if the matter is too difficult it will only confuse him. The teacher must determine her own devices, keeping in mind the foregoing principles.

Mathematical abstraction is the only type that for practical purposes is considered in this chapter. The failure to abstract the idea

of coldness, badness, pleasantness, etc., from their primitive sensations, marks a child as of too low grade for the scope of this book. And the question of whether he sees more readily abstract likenesses or abstract differences is dealt with in its proper place, under perception.

CHAPTER X

IMAGINATION AND INVENTION

THE mental paraphernalia discussed up to this point have been the foundation, the very skeleton, as it were, of mental life. Sensation and abstraction, association, attention, perception, even memory are the wheels and cogs, the smooth running of which is absolutely indispensable to the more elaborate functions of the machine. The testing of these faculties will give the examiner a pretty accurate notion of the child's native mental calibre, stripped of the misleading accidents of training and environment, and in many cases the testing of these faculties alone is enough to uncover to the teacher the source of the child's dulness in lessons.

But to pause at what we may call the mechanics of the mind is as one-sided an

attitude as to investigate the physics of running water without looking at the course of the stream, or to analyse the harmonics of music without listening to its harmonies. In imagination and invention, judgment and reasoning, and in expression and response we have the elaboration of mental life, as it were the fruits of the spirit, and if one would understand a child with anything like sympathy, one must know something of his tendencies in these highly potential directions.

Imagination is to be understood in a broad sense; not simply as a play of fancy, but as a point of contact between intellect, emotion, and morals. Let us take, for example, the difference between a person whom we would call imaginative, and one whom we would call practical, or at any rate unimaginative. The imaginative person is always surprising us; he is thinking, saying, and doing something different not only from what we expect, but from what he himself would do another time in similar circumstances. Furthermore, he is at the opposite pole from an

automaton because, technically speaking, a simple stimulus is enough for a vast spreading train of reactions, whereas the unimaginative person approaches the automaton in proportion as his reactions are diminished in variety, each to respond to its own stimulus. In other words we have a pretty general notion of imagination as a life of ideas independent of immediate presentations of fact, and as a characteristic of this process we recognise the element of surprise, of variety.

No mind can absolutely create an idea; and if we seek the source of the astonishing fertility which a highly developed imagination presents, we must look to the interplay of the person's whole mental make-up. Imagination recalls odd bits, draws inferences, and forms new combinations until it has made a mosaic so perfect that it seems a new whole. And in this mosaic of the imagination the emotions give colouring to the different stones, ethical tendencies determine their shape, and the intellectual faculties fit them together and make the general pattern.

The variety, then, and the self-sufficiency of imagination enter with the unreckoned forces of emotion, part physical, part instinctive, and are joined by morality—by which we mean not simply accepted ideas of right and wrong, but personal habits and modesty, refinement or vulgarity of taste, fair- or narrow-mindedness; in a word, all the predispositions that affect our relations with each other.

In dealing with imagination we may at the same time discuss invention. Invention is the applied form of imagination. At the two extremes we have the so-called creative writer and the scientific inventor. Each uses a highly trained and highly stimulated imagination, the one to produce ideas and pictures which shall suggest other ideas and pictures to the world at large; and the other to produce ideas which shall bear the test of certain laws. The broad difference between imagination proper and invention is that one is personal in its appeal and the other impersonal. And between these two extreme

types of people we have innumerable shadings, to the point indeed where most of us are part imaginative and part inventive.

No one, of course, would attempt to estimate in an examination the quality of so delicate a product as the imagination. And in a child especially, the imagination is likely to be undeveloped, because the child is poor in the materials upon which imagination feeds. The first development of imagination is usually the feeling for drama. The kernel of the feeling is a touch on the primitive emotions, fear first, then anger, then love and hate, up to the more subtle emotional shadings. A strong "positive self-feeling," so-called, often develops into a pronounced dramatic instinct because the person, with his flaming sense of self, his feelings, his desires, pictures more vividly the events that pass before him than the person of "negative self-feeling," whose impulse is to self-effacement.

A touch on the emotions then, such as the story of a rescue at sea, is enriched by the

contributions of memory, and the selection from memory's store in turn is made according to habits of action, accidents of environment, ethical tendencies, and the thousand nuances that make up personality. To discover, therefore, if a child's imagination runs in the direction of dramatisation, have him tell two kinds of stories. Ask him first to tell you some story he is familiar with, and suggest a story with a dramatic point and not a "moral ending." However excellent a lesson is learned from the story of the fox, the crow, and the cheese, the telling of it is a matter of memory and gives no chance to a dramatic imagination. But for a girl, Cinderella, and for a boy, Aladdin's lamp will often bring out not only the strength of the imaginative tendency, but the materials it has to work with.

Some children, on the other hand, are unaffected by fantastic stories, but show a decided dramatic feeling for incidents in their own lives and events of which they have personal knowledge. So that if a child's

telling of the familiar story is colourless, have him tell some tale that touches him nearly; not an educational affair like an excursion, but the story of a fight he had recently, or the description of some happening at home. If the examiner is the child's teacher, it may be hard to get him to talk frankly about his personal affairs, but she is after the child's tendencies, and not the facts in the case, and she can tell even from a partial narrative whether he is literal-minded or interpretative, accurate or inexact, expansive or condensed.

Besides the dramatic instinct, imagination occupies itself with similes and contrasts. The conversation of many active-minded people is made up largely of pointing out that something they have seen is like something else, and of paraphrasing what you say in terms of something like it. To do this well takes a wealth of imaginative material, and a highly sensitised interplay of all the mental processes. In a child the aptitude for similising may be tested with ink blots.

Let the child drop some ink on a piece of paper, and fold the paper on itself so that the ink is smudged. Some peculiar shape will result, sometimes like a butterfly, but often quite fantastic and suggestive. Ask the child what it looks like, and notice how many different things it suggests, how matter-of-fact and accurate they are, or how much the ink blot seems merely the cue for a flight of fancy.

Children's answers in this test are usually very interesting. In one case the blot came out in a jagged fashion which at first sight suggested mountains. But mountains meant nothing to the child, and she turned it about until the likeness of a cow caught her eye, and immediately she was launched on the tale of a time in the country the previous summer. Thereafter, all the possibilities of that ink blot, and of all she made, were twisted into country pictures. It is rare that a child's imagination will cling so persistently to one subject; indeed, until it is trained, the imagination usually roves

in an aimless way from one idea to another.

Bearing in mind that the dramatic instinct and the similising faculty are the first manifestations of the creative imagination, we have to discover whether the child is predisposed toward this unrestrained type of imagination which we call creative and which has ideas for its material, or whether he inclines to the inventive imagination, which works best within the restraints of laws and principles and which has concrete things for its material.

In the absence of any information as to the child's general ingenuity, he may be tested in these simple ways. Give him three words, such as "street," "find," "man," and tell him to make a sentence out of these words. Then tell him to make another sentence, and another, and so on, noticing how many sentences he can think of, and how different they are from each other. This test indicates the aptitude for working within set limits. Many children who show a good

deal of fertility in the ink-blot test, and in supplying details in a story, will be blank in the face of the restraints imposed here; on the other hand, the very setting of limits will act as a stimulus to some children who had little to offer in the unrestrained conditions of the other tests. The examiner will vary her words according to the age and general interests of the child; and she will have the sentences written or spoken according to which form of expression is readier for the child. In both this test and in the ink blots, it is fairer to make a number of tests of each, because the child may show a good deal more liveliness of mind after he understands the process.

Another test of inventiveness is to give the child some mechanical contrivance, explain what it does, and let him try to work it. A toy typewriter, for instance, made of a revolving tin disk with ink pads underneath, will show a child's ingenuity; and if the examiner, after telling the child that it will print letters, apparently pays no more atten-

tion to him, she will get a very good notion of how he goes at things.

The play of imagination in the schoolroom is unfortunately very restricted. It may be said that in our present curriculum an active imagination makes a child interesting, but it does not necessarily make him a good scholar. Indeed, many teachers will say that a lively imagination means inaccurate work. The value, therefore, of the foregoing analysis and tests is vocational, rather than pedagogical. In other words, the child's kind and degree of imagination is a stronger consideration in deciding his path in life than his course in school. But speaking from the broader standpoint of education, however little it may enter the curriculum, a child's imagination has two needs: It requires training and it requires stimulation.

We have said that imagination is the interplay of intellect, emotion, and morality. The training of imagination, therefore, is obviously the training of its intellectual factors.

As we develop voluntary memory, increase associations, guide attention, and exercise perception, we are shaping the channels of imagination. But when we have discovered whether a child's aptitude is creative or inventive, we stimulate that aptitude by supplying it with the materials it craves. That is the obvious proceeding, of course, when a child shows a strong tendency of any sort, mechanical ability, for instance, or a story-telling talent. But in the great majority of school children, the need is for stimulation of any sort.

Most teachers recognise this need of stimulation in their efforts to find some one centre of interest for the child. Nature-study, for instance, has been the point of quickening for many children; others respond to the carpentry classes in settlements, others again to story-book reading, to drawing, to music. But most children will not seek out these interests for themselves; they take what comes before them and make little effort to gratify their possible

cravings. It becomes the teacher's duty, therefore, not only in the interest of a broad education, but out of regard for the progress in her own classes, to determine the child's predisposition and see that it is goaded into activity.

CHAPTER XI

JUDGMENT AND REASONING

OF all faculties judgment and reasoning are the least independent, the most co-operative. They are not original excursions of the mind, like imagination and invention, but they trot soberly in harness, and the tighter the harness, the better is their progress. In other words, when we recognise sound judgment and correct reasoning we are observing the product of experience, of special training usually, and the concerted activity of abstraction, memory, perception, and so on. Once loose from the prescribed limitations, and the break appears. The education of judgment and reasoning, therefore, calls for the check instead of the spur, and is in effect education by indirection.

Judgment and reasoning are mentioned together because each is in turn the outcome and the basis of the other. A judgment, speaking psychologically, is a pronouncement. It is the interpretation we put upon impressions that are capable of different interpretations. If then I say that it is a fine day, most people will agree with me, but I am none the less making a judgment, putting an interpretation on my impressions, because it is conceivable that another person from a different climate, or having different demands on the weather, might say it is very far from being a fine day. That the sun is shining, or that the wind is blowing, is a question of fact, and quite outside the province of judgment; but the matter of being fine or disagreeable—that is, the interpretation of the facts—makes the essential part of a judgment.

The causal connection of judgment with reasoning is seen in a more complicated instance. A proposition is brought to a business man; he judges its merits and reasons

upon it, and the two processes are inseparable. He judges a statement of earning capacity on the basis of probability—from previous experience and the conclusions drawn from it; and he reasons that if the earning capacity is misstated, the dividend-paying power is not what he was told.

Judgment and reasoning are peculiarly the product of special training. The average person is not disposed to use these highly elaborated faculties if he can substitute some simpler process, like memory, association, or one of the forms of perception. We memorise the results of reasoning and act upon them without going through the reasoning process. But the scientist, the philosopher, the lawyer, all specialists, develop and are developed by the constant calls of their professions on judgment and reasoning.

The first developments of these faculties are elementary form and elementary æsthetic judgments; and while elaborated judgment and reasoning enter only slightly into a

school-child's life, it is desirable to test their simpler manifestations.

Elementary form judgment may be tested in a child of six or seven by giving him a square of paper, and a second square of the same size, but the second one cut diagonally into two right-angled triangles. Tell him to make the two small pieces look like the large one. This form judgment is so elementary that in the opinion of many psychologists only mental defectives fail to do it.

Elementary æsthetic judgment is determined in the Binet tests by showing a page of women's heads, some normally drawn and some caricatured, and asking the child which he likes better, this or that. Failure to pass this test at the age of seven is also regarded as the mark of a defective.

But even in these elementary processes, it is clear that the child uses a complex of faculties. In making the form judgment, he must have a definite notion of the square as square, or he might try to put the tri-

angles with their hypotenuses out. He must also have a definite notion of the abstract idea of identity, abstracted, that is, from a great many sensations and experiences of identity, in order to recognise when the two things do look alike. When he makes his æsthetic judgment, he is guided very largely by association and by synthetic perception in determining which face he likes better, *i. e.*, which face is more familiar to him and consequently more right.

Picture puzzles and catch questions furnish more searching tests. In putting together a picture puzzle, a child must observe not only form, but colour. Theoretically he should observe the objects pictured on the different pieces, and fit them together by logical deduction. But in point of fact, not one child in ten up to the age of fourteen will do it in this way. Instead he will twist and turn and try one piece after another almost in automatic fashion until it fits. Judging by the majority, therefore, the use of judgment and reasoning in this test is

more to be wondered at, even in normal children, than their absence. The examiner should notice whether the child knows when he is right. Many children are so uncertain in their judgments that they actually do not see when a piece fits into its place, and they take it out and try another and another. The root of this difficulty lies in poor simultaneous attention, the confused apprehension of images. The training consequently must not begin with developing judgment, but goes farther back to attention.

Another test of judgment is the catch statement, of which the following is an example:

"The wheels of a street car came off. The motorman didn't know what to do, so he drove it to the car barns."

Less obvious is this one:

"My house is larger than yours, and Mr. Smith's house is larger than mine; so yours is larger than Mr. Smith's."

The examiner will notice first whether the child accepts or disputes such statements,

and then, if he disputes them, whether he puts his finger on the point or whether he simply sees vaguely that something is wrong.

General orientation, that is, the way the child relates himself to his surroundings, is an indication of the quality of his judgment and reasoning, and how active they are. Orientation must not be confused with observation. If I ask a child in the schoolroom how many towers there are on some building he passed that morning, I am testing his observation. But if I ask him whether it is morning or afternoon, whether large things are heavier than small things, how you can tell a girl from a boy, etc., I am testing his orientation. In other words, orientation is a kind of common-sense, a judgment and reasoning which one makes from familiar materials.

In all tests of judgment the two main things to estimate are these:

Certainty: Is the child clear in his own mind as to what he thinks, regardless of the rights of the matter?

Accuracy: Does his judgment, whether certain or not, hit the point?

Some children, although seldom right, stick to their point with extraordinary tenacity because it is theirs; others, although they get the point usually right, waver about it, and mull around in so confused a fashion that one comes to feel even wrong-headed cocksureness to be a more hopeful sign.

CHAPTER XII

EXPRESSION AND RESPONSE

THE open highways of self-expression, the broad gates of responsiveness lead far beyond the schoolroom. At the first glance they seem more to be traits of personality than faculties of the intellect. But since no accumulation of facts and no amount of mental dexterity is of any use without an outlet, the teacher comes to look upon the degree of the child's response and the openness of his expression as providing a measure of her success. As she stimulates facility of expression, she not only discovers how sound are the workings of memory, perception, and so on, but that very stimulation develops in its turn the faculties which it calls into action. And as she studies the endless ways a child has of responding to

ideas, to manner, to happenings in his own life, she can foretell the effect of her methods with him.

In thinking of expression and response, one is apt to picture the eager, exuberant child who needs only to be guided, and one realises with a sense of futility that the backward child who is here in question seldom shows these qualities. Nevertheless, the difference between the facile child and the inert one is sometimes only seeming, and the teacher must never be misled by appearance. That a child does not express himself is no proof that he cannot, and that he does not respond to one kind of approach is no sign that he is not amenable to any.

The object of testing the powers of expression is to find out in what direction the child can find his best outlet, and the development of that outlet, whether drawing, writing, or speaking, and however faintly it may appear, should supplement all other training. Teachers are apt to lay so much stress on technical excellence, like grammar, rules of

proportion, and so forth, that self-expression is smothered. And so, although the drill in the mechanics of speaking, writing, and drawing must go on, it can never give to a child eagerness to say what is in him, and incentive to think more that he may say more. Rules for expression make the product more acceptable to the world at large, but they never kindle a spark. And so a part of every child's training should be unhampered creative work of some kind. If he shows a strong predisposition for either talking, writing, or drawing, it indicates his peculiar medium, and his expression may be encouraged in that direction.

The means of self-expression obviously are speaking, writing, drawing, and gesture. A normal child expresses himself more readily in speech than in any other way, but backward children often show unexpected peculiarities. The preferred means of expression sometimes appears in the course of the examination. A curious case in point was Sara Warkominsky, who was ten years old

and very dull indeed. It seemed useless even to try to get her associations, but still the examiner asked her to write down some words—any words she liked. Sara, however, quite unhampered, began to draw her words instead of writing them and she drew an apple, a pear, a strangely shaped egg, and an unmistakable heart. This, of course, did not show her train of thought. The objects were merely some of the things she had learned to draw. But the examiner realised that while she had failed in getting Sara's associations, at the same time she had chanced upon a pronounced tendency in self-expression—if the child should ever have anything to express.

Supposing, however, that no very insistent preference has come out in the course of the other tests, the examiner can determine in two ways whether a child inclines to drawing.

Ask him to draw something. He will either start right off on a house, perhaps, which is apt to be original, or a landscape

with horizon which he has learned. Or he will do nothing at all, being confused by so large an order. If he hesitates a good deal, suggest Indians and a wigwam, or Mary and her little lamb, and see what he will do with it. The examiner must not judge the child's facility by his possible unreadiness, because a dozen causes like bashfulness, misunderstanding, and so on may prevent his seizing the idea at once. But she must base her estimate on the number of details he tries to get in and on the ease with which he finds a form for the idea in his mind. For this reason it is good to give the child an ambitious subject like those just mentioned. Provided the idea is familiar, more details suggest themselves and the teacher gets a better idea of the child's real predilection for drawing.

Children are often curiously fertile in drawing without much notion of proportion or form or any of the factors that make up a recognisable production. The teacher will sometimes get a picture which taxes her ut-

most ingenuity of interpretation, but which at the same time is clearly full of ideas. Separating therefore facility of expression from aptitude with the pencil, the latter is tested by asking the child to copy some simple outline which is shown him on a card. A pear is good for a very easy test, and to make it harder, a bunch of grapes or a bird. The model should be of a size to be copied exactly, and it should not be coloured, but printed in silhouette if possible, or drawn freehand by the teacher.

These two tests, the original drawing by the child and the copying, do not always bear each other out, for the desire to express ideas in form does not necessarily go with the ability to translate from the eye to the hand, and great fertility is consequently consistent with poor execution.

Whatever the result of the drawing test, it is still possible that the child may incline to readier expression in writing, and the examiner can find out by comparison. Ask the child to write out some story that he

knows well, like the greedy fox that was crossing the river with a piece of meat in his mouth, and when he saw the reflection of the meat in the water, snapped for it, and so lost his own piece altogether. Then ask the child to draw the story, and notice whether he puts more detail into the writing or the drawing. Notice also whether he selects some point of the story for his picture and whether it is a crucial point, or whether he draws the story in all its stages.

The tendency to gesture is a matter of observation rather than test. A child who uses gesture much is either limited in speech, and feels his limitations, or, although fluent, has a pressure of feeling behind his words which seeks an outlet in muscular movements. Gesture which points and emphasises speech must be distinguished from restlessness and nervousness, and also from racial habits, as in the case of many Italians, whose gesticulations are characteristic without any reference to what they are saying.

If in the course of her examination the

teacher has discovered one vehicle of expression more than another to which the child inclines, she will build her training upon it and rejoice. But when, as often happens, the child shows no marked tendency at first, freehand drawing is usually stimulating to whatever latent creativeness he may have. It is better than writing, because his freedom of expression in writing is checked by having to think constantly how words are spelled. But let him take stories—fairy stories, adventure stories, anything that appeals to him, and draw on sheet after sheet of paper the various scenes and all the details that occur to him. The teacher will notice that a greater mass of imaginative detail will appear in a rough and ready picture of this sort than in a written composition, partly because the child has never done this kind of thing and is not hedged in by imitation and conventions, partly because the necessity of visualising what he draws in itself creates new material. The teacher must be careful not to criticise the manner

of drawing in any way. Her comment must be entirely on the matter of the drawing in the way of suggesting fresh details and not on its execution. If the child is to have training in drawing, that is a different affair, and he can go through the regular routine of an art class. But even the art class work is helped by the stimulus to expression which has just been outlined.

When the expression is to be in writing, it is better to start with the reproduction of familiar stories. The stories must not be so hackneyed to the child that they are become monotonous, but the teacher may tell him briefly two or three stories, and let him choose which he will re-tell in writing. For although the end of this training in expression is self-expression, at the beginning the child has no self to express, as it were, or at least not much imaginative substance in his self. And he will develop that substance only by gradually filling in and rounding out the ideas of other people. A creative spirit will show itself unmistakably. Meanwhile

the sound proceeding is to furnish it with something to go on.

If the child is voluble, what the Germans call "ready with the tongue," he can tell the stories instead of writing or drawing them, and if, as often happens, this voluble disposition is allied to a dramatic instinct, he will take satisfaction in learning verses. Whatever the means of expression, the principle in training is the same: to make a roadbed so open and smoothed of self-conscious ruts that it will be an encouragement instead of a bar to mental activity.

The object of determining response is to give the teacher some fairly definite idea of what kind of appeals from her will be most effective with the child, and how circumstances in general are apt to affect him. Such observations have no direct bearing on intellectual training; but every teacher will agree that a child's feelings and manner of receiving impressions and his emotional reactions—in a word, what is

technically called his affective behaviour, is a very important factor in her personal relations with him. This affective behaviour is largely the result of environment and more particularly of home conditions. Sometimes a morbidly developed fear or tendency to anger will indicate a pathological condition to which a specialist must attend; and an extreme, undiscriminating affection in children under eight is apt to be a sign of mental deficiency.

Responsiveness cannot be justly estimated by tests, but the teacher must make her determinations by observing the child over a period of time with the following points in mind.

She is to notice first the degree of response and then the comparative responsiveness to:

Pleasure—pain.
Affection.
Fear.
Anger.
Shame.

Curiosity.

Praise—blame.

For instance, if the child is keenly alive to praise and blame, is his response allied to fear, or is it a sign of ambition? Is his reaction to blame one of anger, or shame, or petulance?

Is his curiosity a kind of general inquisitiveness or more what we call a thirst for knowledge?

Does he show anger in sullenness or outbursts?

Is his display of anger checked by fear, *i. e.*, of the teacher, or is it unreasonable, *i. e.*, nervous, or does it seem to have a certain righteous character even in small things?

Fear is not usually shown independently, but as already indicated, appears as a factor in other responses.

Do the child's affections seem to be of an emotional character so that they actually influence his actions, or are they simply attachments based on propinquity and expediency? The question of the teacher's

personal hold on the child is involved in this type of response.

Pleasure-pain reactions are to be noted in connection with physical sensations, the degree of keenness with which the child feels hunger, cold, and their opposite gratifications; or in connection with the intensity of anticipation and disappointment which he displays.

The great interest in studying a child's responses is in tracing out the relation which his emotional nature bears to his intellectual development. The repressive effect of fear, to take one of many reactions, is hardly realised because it is so often indirect. The following is an instance.

Julius Sternberger was twelve years old, and his most marked defect was poor voluntary memory. Accordingly he received training in this particular faculty, and as long as he was by himself, he came to do his lessons normally. But in the classroom his bursts of anger puzzled the teacher and neutralised her efforts. It was suggested

that she watch the boy especially in respect to his responses, and in a few days this curious situation was revealed:

Julius always became angry as he recited, even before the teacher praised or blamed him. When he became angry, the teacher rebuked him, but would pass on to the next child and leave Julius alone. If, however, his answer was short, and proved to be wrong, the teacher would linger over him until he got it right, and Julius remained as it were in the public eye. This unfavourable prominence he apparently dreaded more than the teacher's rebuke for losing his temper, and the dictates of fear accordingly led him to habitual bursts of anger with the result that his mental activity was stunted.

When she had made this analysis, the teacher changed her tactics; she penalised Julius more severely for his bursts of temper, but contented herself with simply calling his answers wrong when they were wrong and explaining the case without direct reference

to Julius. This shifting of pressure, so to speak, is only one of a thousand cases where the difficulty will yield to a little intelligent observation.

The results of a teacher's observations in the general matter of response will guide her further in determining whether home conditions are seriously at fault, whether the child shows a morbid sensitiveness on any point that calls for a physician's examination, and in general she will be guided in her own attitude toward the child. This analysis of response does not in any way touch on discipline or on the treatment of every-day naughtiness.

CHAPTER XIII

TEST INTERPRETATION

THE teacher; we will suppose, has been giving tests, and making minute observations on the child's behaviour, both conscious and unconscious. She has given the tests haphazard as they came to hand, and she has made no notes. She has acted as if she were sitting down to entertain the child for an hour and has used various materials as they came to hand. But now, at the end of the examination, when the child has gone away, she wishes to make a record and to balance one faculty against another. Some children are so uniformly dull that only by making such a comparison can the teacher discover the essential weakness or, indeed, the readiest point of appeal.

The following outline of the tests, all of which have been explained previously in detail, will give the examiner an idea of the ground to be covered. And as supplementary to this outline are given the main points of which the teacher must take note. Her watchfulness should be unceasing, for it cannot be said too often that it is the small, unforeseen, unclassified things that most surely reveal the child. But with an answer on all the points given here, the teacher is in a position to make a diagnosis.

The tests are all simple, even rudimentary, because their object is the testing of the rudimentary faculties which are combined in our more complicated activities. For this reason no test is made of reading, because reading is complex and throws no light on the structure of the mind. But if the examiner finds a poor homogeneous attention, or a deficient abstraction process, she can infer trouble with reading and at the same time diagnose it.

Difficulty.

Is the child complained of in lessons or conduct?

The difficulty should be described as specifically as possible.

Sensation.

Tests.

Vision: Sorting coloured worsteds.

Sound: Estimating relative heights of notes, the number of notes in a chord.

Visual- or ear-mindedness: Answering questions like: "What do you think of first when you think of a band?"

Touch: Distinguishing between feeling of different substances (see pp. 91, 92). Sensitivity to distance between points of a pair of dividers.

Smell: Identifying smells and discriminating between them.

Taste: Discriminating between salt, bitter, sour, sweet.

Deductions.

What is the child's absolute sensitivity to colour, sound, smell, touch, taste?

Which sense is relatively most keen?

Which sense seems to play the most important rôle in his ideas?

Abstraction.

Tests.

Mathematical processes: Solution of sums in mental arithmetic, like $3+2-1\times2+3+1\div3=?$

Number sense: Solution of sums in mental arithmetic, like: What is the number that gives 12 if you add 3 to it?

Deductions.

Does the child have trouble in getting the ideas of addition, multiplication, and so on, and distinguishing between them?

Or, does he show inaccuracy in the actual figuring?

Association.

Tests.

Writing a list of ten to thirty common words.

Answering the first word thought of on hearing the examiner's key word.

Deductions.

Are the associations verbal or objective? Continuous or in groups? Rapid, easy, or monotonous?

(In verbal, rapid, jerky, monotonous associations, note possible tendency to hysteria.)

Attention.

Tests.

Simultaneous: (a) Unconscious: The number of pictures on a card noticed by the child while the teacher talks about only one of them. (b) Conscious: The number of pictures noticed by the child when the card is shown him for a few seconds without comment from the teacher.

Homogeneous: Crossing out letters on a printed page, either a single letter wherever it occurs or two recurring letters, one with a vertical stroke and the other with a dash.

Disparate: Reading aloud an easy verse and at the same time writing A's on a sheet of paper. More complicated, writing the alphabet at the same time as the reading.

Deductions.

Simultaneous: How many things does the child remember?

What kind of things seem to stick in his mind?

Is his conscious or his unconscious attention better?

Homogeneous: How many letters were missed, *i. e.*, what proportion of the total number?

Is the child more accurate at the beginning or the end? (If markedly at the beginning, it indicates a tendency to fatigue; if at the end, a

tendency to automatism; see pp. 42–44.)

Does the child go straight down the page, or does he cross out the letters at random?

If he has no method, as in the latter case, is he nevertheless successful?

Does he go back and look for mistakes?

Disparate: Does the child help himself with rhythm?

Does he do the reading and writing successively, *i. e.*, transferring his conscious attention from one to the other?

Perception.

Tests.

Analysis: Answering questions calling for simple identifications and distinctions, like, "Why are paper, sugar, and snow alike?"

Solving simple analytical word

puzzles, like reducing a word such as *furniture* into *fur*, *in*, *true*.

Answering part-wholes questions (see page 113).

Synthesis: Answering questions which demand following out to conclusions, like, "If you saw a horse and waggon standing, and the horse had no harness on, what would you think?"

Working out easy anagrams.

Deductions.

Does the child answer the analytic or the synthetic questions more readily?

Does he split up or construct a word more easily?

Apart from the correctness of his answers, does he make distinctions which are really differences?

Memory.

Tests.

Automatic: Repeating numbers, words, nonsense syllables, beginning with four, and going as high as possible.

Voluntary: Memorising the order of laying pictures on the table.

Retentive: Must be determined by teacher's observation over a period of time.

Deductions.

Automatic: What is the highest number that the child averages in accurate repetition?

Voluntary: How long does the child take to memorise? How long a series can he replace accurately?

Imagination and Invention.

Tests.

Dramatic imagination: Telling a story, (a) fiction, (b) child's own experience.

Imagery: Making ink-blots and telling what they look like.

Invention: Making sentences containing several given words, *i. e.*, *street*, *find*, *man*. Working out the mechanism of some simple instrument, *i. e.*, an elementary typewriter.

Deductions.

Is the child more disposed to imagination proper or to invention, in other words, to a free or a restricted play of the mind?

Are his mental images fantastic, or are they limited by environment?

Does his imagination run in any one groove?

Judgment and Reasoning.

Tests.

Elementary form judgment: Making two equal triangles into a square.

Elementary æsthetic judgment: Judging between normal faces and caricatures.

Working out picture puzzles.

Answering catch questions (see pp. 154, 155).

Answering questions on general orientation (see page 155).

Deductions.

The first two tests will be failed in only by defectives.

In the picture puzzles, does the child fit the pieces by shape, colour, or sense of the picture?

In the catch questions, does he accept the teacher's statement?

Or, if he disputes it, does he see the point or does he merely sense in a vague way that something is wrong?

Is he certain of his own judgments, right or wrong?

Is he accurate in his reasoning?

Expression.

Tests.

Copying simple outlines.

Writing and then drawing a simple story.

Telling a story, either the child's own experience or some story he has learned.

Deductions.

Does the child show greater facility in speaking, writing, or drawing? Is the preference decided?

Does he show a tendency to question as an aid to speech?

Is his expression in general ready or difficult?

Do technical difficulties in writing or drawing seem a bar to his using that form of expression?

Response.

Tests.

Can rarely be made in the classroom or clinic. But the examiner can ascertain from teachers or observe in the course of other tests what response (absolute and comparative) the child makes indicating:

Pleasure—pain	Shame
Affection	Curiosity
Fear	Praise—blame
Anger	

Deductions.

Is the response to any one of these affective feelings morbidly keen?

Does that excessive sensitivity point to physical trouble or bad home conditions?

Is the response to praise and blame allied to fear or to ambition?

Is the reaction to blame one of anger, shame, or petulance?

If the child is given to anger, is he also affected by anger in others?

Is curiosity inquisitive, or a specialised desire for knowledge?

Is affection excessive? Is it undiscriminating? Is it based on personal attraction or on benefits conferred?

How keen are pleasure-pain reactions in connection with (1) physical sensations, (2) anticipation and disappointment?

If the child to be examined does not know

his letters, or if he shows a very poor mathematical abstraction, if he cannot answer the simplest questions of the type outlined under perception, and if he is very slow at an easy picture puzzle, the probability is that he has some congenital mental defect, whether hydrocephalic, hysterical, epileptic, or otherwise.

Such children, who should be in institutions, and who in any case will not be able to earn their living and take a normal part in community life, are not in the scope of this work. They are, however, in the province of the teacher, and for the purpose of helping her to determine whether or not the child is a defective and not a border-line case, the following tests are given. Unlike the foregoing tests, the measure of the child's ability in these tests is whether he can or cannot do them, and not how he does them.

Children of seven and over should be able to do the following:

1. Copying a square (Binet and Simon). The child must be able to make

the sides of his rectangle approximately equal and must make the lines join in the corners.

2. Saying the days of the week, first forward and then backward.

3. Counting taps. The teacher hits the edge of the table with a pencil eight or nine times at irregular intervals, and asks the child to count the strokes. He must count to himself.

4. The tests given above for elementary form and æsthetic judgment may be used to determine mental deficiency.

5. Asking the child his sex (Binet and Simon say that this test should be passed by normal four-year-old children).

A good many children of low mental grade are still able to pass these tests. We cannot say that all children over seven who meet these five tests are therefore capable of being trained into competent human beings. But we do say that such children are thereby worthy of a more minute consideration and that children who fail on these tests show themselves mental defectives.

The teacher will find that the detailed examination herein set forth provides for an analysis of faculties which are not developed in young children and not awakened in many backward children. Association, for instance, is practically impossible to test in a child who cannot write, because if one attempts it verbally, the result is liable to be objects in the room, or some sort of definition of the word suggested by the examiner, and not true association at all.

The tests of perception to determine the child's predisposition to analysis or synthesis are not valuable before the age of ten. If the child is over ten, but does not know his letters, perception may be partially tested by the analytic and synthetic questions suggested.

Where a test cannot be made, however, the loss is not serious, because the faculties which can be tested are the ones that the child uses, and his difficulty can still be diagnosed from an analysis of his mental activities which are in play.

In order to show the method of diagnosis, an instance is here given in summary:

George Cascio, 15 years old; Italian; heavy and overgrown. Complained of because of absence from school and backwardness when there. Reported hopeless by the truant officer. Reported as "unable to learn" by the teacher.

Sensation: Normally discriminating in all five senses. His sensitivity to colour over sound is marked, but he appears to be ear-minded.

Abstraction: Accurate in figuring and seems to grasp the mathematical processes.

Association: In groups, is difficult, and tends to be objective.

Attention: Simultaneous attention is poor and easily confused. He remembered two out of eight pictures when looking at the whole card; none when talking about one of the pictures.

Homogeneous attention is good, and persistent.

Disparate, not tested.

Perception: He appears confused in synthetic processes. In analytical questions he perceives clearly, but has some trouble in working out the answers, *i. e.*, they are right, but come slowly.

Memory: His automatic memory is indifferent; five digits is his average.

His voluntary memory is fair, *i. e.*, two out of three times he can get the series of eight right.

His retentive memory is said to be long, but limited in its variety.

Imagination and Invention: His invention is very poor, and his imagination is more quick than clear, *i. e.*, tends to be fantastic, but he has not the dramatic wealth of detail.

Judgment and Reasoning: His elementary judgments are normal, and he has a good deal of certainty and independence.

Expression: He shows a strong preference for drawing as a means of expression, and added to that a very accurate

visualisation of detail and a good sense of form. He does not incline to narrative, either in talking, writing, or drawing, but when a very simple version of Roland's death was told him the boy drew a spirited picture of a soldier on horseback blowing a horn, with a good deal of detail like the handle of the bugle, the stirrups, and so on. In language he had nothing to offer but the recital of the main facts, which of course was a matter of memory.

He is not given to gesture.

Response: It does not appear on his teacher's account that he shows any very keen affective feelings. His independence of judgment seems to be borne out in a certain indifference either to praise or blame. His teacher describes him as docile and unresponsive. His docility, that is to say, his non-resistant disposition, probably checks the development of his more violent feelings, such as fear, anger, and shame. And his

general lethargy of physique is contrary to a pronounced curiosity.

Summing up, therefore, from these general observations, it appears that George has a poor simultaneous attention and an indifferent automatic memory, the effect of which is to cut him off from a great many of those passing impressions which we take for granted will be registered photographically on a person's brain. In school, much of what the teacher says, and many of her explanations pass him by, because these unconscious, involuntary faculties do not work normally. Set him at a job, however, and his homogeneous attention and voluntary memory, conscious faculties, serve him fairly well. For the sake of improving his classroom work, therefore, the first point is the training indicated for simultaneous attention and automatic memory.

Coming to the more elaborated faculties, it is evident that his invention can be quickened, and his imagination greatly developed by utilising his disposition to draw.

There is no sign that he has an overmastering talent which demands technical instruction, but his fondness for expressing himself in that form can be made the means of unfolding his dormant possibilities. In particular, his associations, which are now difficult and objective, will tend to become more free and elastic if he has training in illustrative and imaginative drawing. The very act of thinking out details to the point of putting them into a drawing will enrich his whole idea of a house, for instance, and ever afterward "house" will stand for more possibilities than it did when it was merely a place to go in and out of.

This imaginative drawing, too, will tend to quicken his perceptions. He already has a predisposition to analysis, which the thinking out of details for an idea will sharpen and clarify. And on the other hand, the very expression of his ideas will tend to strengthen his synthetic perceptions, because in any kind of creative work one gets the habit of foreseeing what this or that will

lead to, and whether it leads where one wants it to.

One can only outline the infinite possibilities which open up before a teacher if once she can discover or persuade some aptitude in some direction of self-expression.

Condensing, therefore, the diagnosis and suggestions for George Cascio we find that for reference we can make this kind of a record:

Complaint:

Cannot learn at school.

Result of Examination:

Poor simultaneous attention is his only defective faculty; the others are sluggish probably on this account.

Has marked fondness and facility for drawing.

Suggested Training:

For simultaneous attention: Hunting for small objects in plain sight.

Describing pictures looked at for a few seconds.

Let the teacher write words, then sentences, showing them to him for three seconds; then taking them away, ask him what was written.

For stimulating other faculties, using drawing facility: Have him draw scenes and then stories in successive scenes, either out of his own head, or from bare facts suggested by the teacher. He must furnish the details himself.

The materials needed for the examination are these:

1. Simple picture puzzles. Can be bought three for ten cents.

2. Two pasteboard cards, 11 x 9, on which are pasted pictures cut from magazines, for instance on one a watch, a bed, a typewriter, a pen, a bicycle, a teapot, a man with a mandolin, a cat; and on the other, an automobile, a chicken, a man on horseback jumping a

gate, a shoe, a table. These cards are used either separately or together for tests of simultaneous attention.

3. Silhouettes or pictures of eight animals pasted on separate cards—a rabbit, cat, cow, pig, bear, camel, elephant, horse.

4. A 3-inch square of paper. Also a 3-inch square cut into triangles.

5. A book of large print used in crossing out letters.

6. As large an assortment of coloured worsteds as possible.

7. A box of letters for anagrams.

8. Outlines of a chick, a pear, a bunch of grapes, to be used for copying.

9. Three pictures of heads of normal people, and three caricatures.

10. White paper and pencils.

The following tabular form is suggested for the detailed record of the examination:

Difficulty	*Diagnosis*		*Training*	
Attention Simultaneous Homogeneous Disparate	*Memory* Automatic Voluntary Retentive	*Association*	*Abstraction*	*Perception* Analysis Synthesis
Sensation Visual Auditory Touch Smell Taste	*Judgment and Reasoning*	*Imagination and Invention*	*Expression*	*Response* Pleasure—pain Affection Fear Anger Shame Curiosity Praise—blame

CHAPTER XIV

METHODS OF TRAINING

IT is evident that when one goes about making a diagnosis, one cannot hold a brief for any single kind of training as a cure-all. One must be as impartial in choosing the remedy as in looking for the disease. The individual difficulty is the thing, and any device, fantastic or obvious, which tends to remove that difficulty is the only cure worth considering.

As a matter of practical experiment, backward children can be brought up to a normal average in their lessons by half an hour's daily individual training. The person in charge of the training may even be inexperienced, provided only the diagnosis has been made by a competent examiner and the directions given by her for training are clear-

cut and specific. By way of outline, therefore, for teachers who are able to give or to procure training outside of the regular classroom routine, the following suggestions are made. They do not require elaborate material, nor involve unusual methods. They are intended to utilise the things that a child does every day and to make them serve the purpose of building up the mental faculties in which he is weak. The devices given below have been tried and found to be successful, but the writer realises that they only suggest a thousand other resources already at the command of any good teacher. They are offered as a key to the manner in which those resources may be used most effectively.

Sensation: Visualising: Write a short word, like "ball" or "man," show it to the child for a moment, and ask him to write what he saw. The length of the word can be increased, but if sentences are used it becomes a matter of simultaneous attention.

Sound Reproduction: Have plainly written

on slips of cardboard 20 or 30 words, either of one syllable or else rhyming, and tell the child to pick out all those, for instance, that have the sound of *at*. This can be made harder by increasing the number of words and by having the child look for two sounds at once, like *a* and *tion* in "consternation." These two devices develop mental sensitivity for purely schoolroom purposes, and are used especially when there is trouble with spelling.

Perception: The analytic or synthetic turn of mind being a matter of how one looks at things and consequently a matter of daily environment, it is not possible to foster one or the other very strongly in the schoolroom. Broadly speaking, anything that stimulates invention encourages the synthetic turn of mind; or if the teacher especially wishes to develop the habit of analysis she can do it best by asking "why" questions in history and wherever the child can be expected to make a reasonable answer. But in most cases the teacher will be wise if she takes advantage of the tendency toward analysis or

synthesis which she is supposed to have determined, and bases her explanations upon it. For instance, if a synthetically minded child cannot do grammar, try writing out the parts of the sentence, as, for instance, *Subject*, *Verb*, *Object*, on separate slips of paper. Write also the parts of a given sentence on slips of paper, like: A book—fell—off the table. Give the child these six slips mixed up, and tell him to make the sentence and then to match up its parts with the other three slips. Assuming that he is familiar with the terms but does not understand their use, this device, by calling for synthetic activity, tends to clear up confusion, and has been used with a good deal of success.

Abstraction: Measuring objects about the room with a foot-rule and, as a next step, estimating the measurements before making them, is good training for a child whose trouble in abstraction is not pronounced enough for feeble-mindedness. An instance appears on pp. 224–226.

Association: A set of 35 or 40 pictures

as varied as possible, each pasted on a separate card, and a list of 35 or 40 common words, also on separate cards, are a necessary part of any training equipment, and are good materials for training association.

The child is to sort the words according to their use or according to their action, in order to increase his associations and make them more elastic. For instance, if a child with the verbal type of associations is set to picking out all the words that have to do with summer or with cooking, he is obliged to consider their meanings instead of relying on the less intelligent association by sound. The pictures may be used for the same purpose. Ask the child to sort out all those that have growing things in them, and gradually increase the complexity of the exercise until he is drawing inferences; as, for instance, in sorting the pictures in which somebody is angry.

This device not only multiplies associations, but it makes for the forming of

clearer abstract ideas, and it sharpens observation. In order to realise that a picture which shows two men with their shirt sleeves rolled up eating their lunch under a tree in full leaf has anything to do with summer, the child must first notice the various details of the picture, must have a clear idea of what they mean, and must be able to accept or reject—that is, to associate these details in relation to the idea of summer which he is at the moment pursuing.

Attention: Simultaneous attention is trained by a game like "hide the thimble." A small object is put in plain sight, and the child hunts for it. Jackstraws is another device; or the child may look out of the window while the teacher counts three and then tell everything he saw. The object in training simultaneous attention is to eliminate all possibility of mechanical action and make the child depend on what faculties he can summon at the moment.

Homogeneous attention is trained by having the child hammer nails, for instance,

in the upper left-hand corners of all the squares marked out on a board; or by the device known as magic dots or by a peg-board, where he must make a given simple pattern over and over again; or by tracing pictures; or by stringing beads in a given order, like 2 red, 1 white, 3 blue, 2 yellow, and so on. The object is to make the child pursue a single idea which he must hold clearly before him in order to keep doing his work accurately. One must avoid fatigue in training homogeneous attention, so that several different devices may be used in the same half-hour, all having the same object in view. The teacher will see the effect of this training in improved concentration.

Memory: Automatic memory may be trained in this way: Have the child make lists of common things, like the furniture in the kitchen at home, or all the things one cooks with, or all the things he has in his desk at school, or, if he goes to a carpentry class, all the tools he uses. The principle in training automatic memory is to call for a

recollection of things which the child habitually sees, but in a more or less mechanical fashion. The teacher must not confuse this method with the reproduction of new or immediate impressions, which is the training for simultaneous attention. Another way to train automatic memory is to have the child repeat a series of words, numbers, or nonsense syllables which the teacher says to him, gradually increasing the number.

The training for voluntary memory has been described already in some detail. The foundation must be laid by stimulating the child's associations, and the method found most effective is to have him write original rhymes. At the same time he is learning his own rhymes by heart, he is to learn some on similar subjects, and gradually the committing to memory can supplant the verse writing. The teacher must keep in mind that association is the rock-bottom fact in voluntary memory, and for this reason memorising prose is advisable because the

association process is not helped out by rhyme and rhythm.

Retentive memory is too largely a predetermined quality to be much affected by any training the teacher can give. It is merely retentive memory alone that is at fault, and when voluntary memory or homogeneous attention is improved, the sieve-like habit usually disappears.

Imagination: Re-telling stories, illustrating stories by freehand drawing and making up stories to go with colored pictures are all devices previously described which stimulate and also train the imagination.

Invention: Invention, which may be regarded as applied imagination, is trained for school purposes in the following ways:

(*a*) By picture puzzles, which call for consideration of the shapes of the pieces, their colour, and their meaning; and, for small children, by pieced animals which are on the same general principle.

(*b*) By supplying the missing words and letters in such a story as the following:

Where the Dandelions Went.

Wh Willy two old he
red farm th yard front The
dan were th k there, so that the
y d look yellow instead of One
day his m went into the and
found that many were gone. Look into
the well, could no water at all,
on d For Willy been
busy try fill

The teacher will vary the difficulty of this specimen as seems to her best.

Judgment and Reasoning: These are faculties that do not directly affect the child's school work. Together with expression and response, they are part of the workings of environment and all the subtle influences of life outside the schoolroom. To attempt training them, therefore, is something like putting the cart before the horse. For, while the test will guide the teacher in making her estimate of the child, she had best concentrate her training on the more primary

faculties and the more glaring faults, trusting the finer points to an harmonious co-ordination.

Hysteria: When the teacher suspects a child of mild hysteria, of the tense, repressive kind described in this book, she will find the following methods useful:

1. Throwing and catching with a hard ball both against the wall and with the teacher.

2. Swinging Indian clubs in sufficiently complicated figures to call for both limberness and presence of mind. Following the teacher's lead through a maze of revolutions is especially good training.

3. Jackstraws, which calls for a continual readjustment of the energy to be used in picking up the straws.

4. Various calisthenic exercises to reduce the stiffness which usually goes with congenital hysteria; to be followed by

5. Complete relaxation, lying flat on the back.

Symbols: The difficulty of many children

in connecting the sound and look and meaning of a symbol will be discussed and the training described.

The following, therefore, is only a summary of some of the successful devices:

Cutting out letters—to impress their shape by bringing in the associations of the large muscular movements used in cutting.

Lotto—to connect the look and sound of numbers by having to search for them.

Writing letters and saying them at the same time.

Doing steps to the alphabet.

Learning tunes with the alphabet printed on the piano keys.

CHAPTER XV

TYPICAL BACKWARD CHILDREN

WHEN children are on the border-line of mental defect without actually overstepping it, the teacher usually describes them as backward because they are dull and inert, or backward because they are hard to discipline, or backward because they have some physical ailment.

To make a more detailed classification, children who give trouble in the schoolroom show one or more of the following characteristics:

I
1. Inherent functional brain disturbance.
2. Sense defect.
3. Under-nourishment, anæmia, adenoids, etc.

II
1. Slow rate of development, *i. e.*, retardation, shown in general sluggishness.
2. Intractability, either (*a*) nervous and fitful, or (*b*) sullen and obstinate.
3. Listlessness, lack of application, irregularity in lessons.
4. Hysteria.

The first group is outside the scope of this book; the second, however, permits of psychological analysis and training. And in this chapter it is proposed to describe children of these frequent types, to show how their failings were diagnosed, and what methods were used in training them.

1. Concetta Ferrito, ten years old, was a case of slow development. Her teacher said she had no concentration, and although she was docile, nothing seemed to make any impression on her. On examination she showed an ingenuity amounting to a talent for avoiding mental action. In every faculty

her response was as automatic as possible. Her simultaneous attention and automatic memory were good, and her associations, made verbally, were easy, and drawn from objects in the room. For instance, to "house" she would answer "fireplace," which she was facing, her whole tendency being to avoid mental exertion. Her homogeneous attention was poor. She saw three *t's* in the first line, and mechanically crossed out three *t's* in a line all through the rest of the page. Her voluntary memory was very poor. Perception tests were quite impossible, and in every other test she went just as far as she could by using her mechanical faculties; in other words, without thinking.

The training for Concetta, then, demanded a positive reaction. A picture was given her of a little girl in a nightgown with a candle in her hand standing at a window and looking out.

"What time of day is it in that picture?" asked the teacher.

"Morning," said Concetta, with an enchanting smile.

And so the picture was discussed, and the significance of the candle and the nightgown was observed until it dawned upon Concetta that it was night-time in the picture. Every day she looked at pictures for half an hour and answered questions about them, and when she had answered, the teacher would say, "How do you know?" obliging her thereby to scrutinise her own ideas, and getting mental activity out of her without stupefying her with too difficult material. It is useless to expect a child of this type to tackle the new subject-matter that is presented in class. The automatism which is at once the cause and the result of her backwardness will keep her for ever resisting, and to break the vicious circle she must be coaxed into mental action by giving familiar things in a new way. Then, when the habit is started, the teacher can successfully begin on new subjects.

2 (*a*) Celia Warkominsky, ten years old, was complained of for her "attitude." She was nervous and hard to manage in class,

and although she seemed to understand the teacher's explanation, her work was poor, accounted for on the ground of "attitude." Her examination showed normal faculties in general, but a good deal of inaccuracy, which was a matter of carelessness because it disappeared when she was pulled up. But she had to be pulled up continually. Her associations were at random, verbal, and quickly formed. She seemed unable to perceive any idea synthetically; that is, although she could spell quite well, she had no resources in finding out the word "mother" when the letters were given her. This confirmed the fact which her whole examination brought out: that her faculties were normal enough, but that she did not know how to use them.

Her inaccuracy probably had its beginning in physical nervousness and anæmia, which made her restless and then careless. But by the age of ten, it had become a mental habit which could only be cured mentally, and all that physical improvement could do

would be to check the aggravating cause. In training Celia to a more precise use of her mind, the device must not be too abstract. It must be something in which her own mistakes pull her up of themselves, and make her correct herself. In such cases it is a good thing to make one of the child's own senses do the training. Celia was fond of tunes, it appeared, although she was not especially sensitive, and on that basis the following experiment was made. She was taught "The Wearing of the Green"—which she chose—on the piano with one finger. It was immensely difficult for her, but it did two things: she could not pass over her mistakes, and when she finally got a phrase right, she had a sense of triumphant satisfaction that showed her for the first time the sharpness of the difference between right and wrong. She learned a number of tunes with one finger, and then simple basses.

The effect was first noticed in her more accurate arithmetic, and if the training could have been followed up with physical improve-

ment, the difficulty of Celia's "attitude" would have been solved. As it was, the teacher said that she was still hard to manage, because of her nervousness, although her work had improved.

2 (*b*) Tony Ferrari was unmanageable, sullen and obstinate, partly said the teacher, as a result of home conditions. But he was dull too, and harder to teach because he was hard to discipline. So he was examined to find out the intellectual parallel to his bad behaviour. Tony was ten, and small, but wiry and seemingly well enough nourished. He could not read, and no one had been able to teach him even the alphabet. Modern methods like phonograms and play systems fell flat.

Tony showed reasonably good mental faculties. His attention, memory, abstraction, and imagination were all far from defective. The examiner wondered where the trouble was, and how, in the face of his inability to read, she was going to make a complete enough examination to find out.

Then some questions bearing on general orientation, such as what time of day it was, what time of year, what kind of clothes girls wore that were different from boys', and so on, which Tony couldn't answer, showed an interesting discrepancy in his development. Pursuing the questions further, it appeared that Tony was quite at home with money and that he knew just how he had been brought from Greenwich Village to East Sixty-fifth Street, although it was the first time. Here then was a boy with no special brain defect, who yet was markedly dull in school and showed an almost imbecile ignorance of his surroundings save in one or two directions where he was acute. His aptitude apparently, had been developed under pressure; that is to say, the familiarity with money which becomes a matter of self-preservation when a boy runs errands and also goes with a "gang," and alertness in remembering the way, which his night roamings would also make a matter of self-preservation.

The examiner inferred, therefore, that Tony's association paths were not of the most impressionable kind. She could not test his associations directly, because he could not write; but it was evident, in spite of a fairly good memory, attention, and power of abstraction, that simple ideas or mental images happening together were not violent enough to create association paths in Tony's brain; that the idea had to be reinforced with some practical bearing. It was natural enough then, that letters—pure ideational symbols—should pass Tony completely by.

Acting on this explanation, an experiment was made to teach Tony the alphabet. The first point to be made was to create associations so vivid, so material, as it were, that each letter should take on an existence of its own in his mind. When mental associations are too subtle to impress, one tries muscular associations. Tony accordingly learned a kind of little dance, for each movement of which he said a letter. Each movement is distinct and well-defined. For instance, step

forward with the right foot saying A; step forward with the left foot saying B; step backward with the right foot saying C; step backward with the left foot saying D, and then sideways, and with arm movements, each one being sharply made at the instant of saying the letter which belongs to it.

This experiment is very interesting to work out. Tony learns the movements of the dance very quickly and wants to do it without regard to the letters, and the teacher at first must chant the letters over and do the dance along with him to prevent his hurrying on and blurring the associations she is trying to form. Then gradually the teacher will see the working of the theory. Tony is left alone to go as far as he can; he will get perhaps through A, B, C, D, and hesitate; and the teacher will see him tentatively making the next motion of the dance, and again and again, until finally the familiar muscular movement calls up the letter. This is the process all the way through until Tony knows his alphabet, and can say it

without doing the dance, and even then he will often help himself out with the muscular association.

So much for teaching the sequence of the alphabet. Arbitrary as the alphabet is considered, it is a foundation that serves very well in teaching the more important steps of reading to a backward child, because it makes a kind of framework for the rest of the associations one is trying to build up.

The next process is to connect the name of a letter with its shape. A number of ways offer themselves, all based on the same principle that has just been illustrated, and that is to implant the symbols which we call letters in a ground of substantial and concrete associations, of which the most substantial seem to be muscular. The device which succeeded best with Tony was to have him write a letter, saying at the same time its name, in this way—•A•; that is, say "a" on the up-stroke, "a" on the down-stroke, and "a" on the cross-stroke. B also is repeated three times, once on the vertical line and once

on each loop, in this way—$^{b}B_{b}^{b}$. C is said only twice, in this way—$^{c}C^{c}$; D only twice —$^{d}D^{d}$; and so on. Each letter is made in as many simple movements as its shape allows, and the child says its name with each movement. The muscles involved in this device are smaller than those which the dance brings into play, and consequently it is more successful when it follows with the dance as a foundation. The sequence of the alphabet, which the child has learned, is kept while he is learning to connect the look of a letter with its name, and the fact of his having this orderly arrangement in his mind hastens the association process.

When a child's mind is so rigid as to need training of this kind, the teacher must be prepared for very slow progress. If he learns three letters in half an hour a day, he is doing reasonably well. Six or seven may be attempted; but the teacher is warned against keeping up the training too long at a time and so neutralising her efforts by the child's fatigue.

3. Emily Engelhard was a heavy-looking, amiable girl of fourteen. She was quite docile, and intelligent enough to talk to, but she was listless and lackadaisical in school, and varied very much in her lessons. She was fairly good in reading and language work, but very poor in arithmetic. The teacher said she could not seem to make Emily try; she did only what she could do without trying. The teacher would like to prick her.

Emily's examination showed faculties of a uniform greyness, not keen, that is, and yet not deficient, either. She appeared to be the hopeless kind of child that seems to have no mental hills or valleys marked enough to outline; the kind of child one can only try to stimulate by training self-expression and imagination. But persistent analysis disclosed that Emily did have a mental valley of sufficient depth to explain her school difficulties, and that particular valley was the formation of abstract ideas. And although she saw at a glance that a pile of ten peanuts

is larger than a pile of six peanuts, she had no clear certainty that the number 10 is larger than the number 6.

This defect in the abstraction process showed itself so prominently in mathematics because in mathematics only, of all Emily's activities, was the support of the concrete withdrawn. In reading, of course, she had the symbols of the letters to bolster her up. In geography, history, language-work, she got along fairly well by an effort of memory. Dull she appeared, of course, and totally unimaginative, because she was unable to hold ideas separate from things and symbols. In fact, Emily is an interesting example of how far a child can substitute memory for the other faculties that the school is supposed to train, and withal, up to the age of fifteen, be only detected as "not trying."

The remedy for this defect in abstraction at Emily's age calls for a good deal of time and patience. It began with the familiar device of coloured sticks. The teacher put

them in two piles, one of three and the other of seventeen.

"Which is larger?" she asked, and Emily pointed to the pile of seventeen.

"How would you make the little one larger?" she pursued, and Emily answered, "Add some from the big one,"—showing that she knew the meaning of addition, even if she could not separate it from piles of things.

The teacher then tried the reverse process. She took one stick from the small pile and put it on the big pile.

"Did I make the big pile larger or smaller?" she asked, and Emily answered: "Smaller."

In the first case, the double stimulus of seeing the sticks and being called on herself to make the pile larger or smaller carried Emily safely through the estimation of sizes. But in the second case, in the slightly more abstract process of forming an exact idea of what the teacher did, she was helpless. No memory would help her, nothing but the abstract idea of relative sizes, which to

us seems so rudimentary, and to Emily's teacher, so insuperable. When one took a single stick and broke it, Emily was not always clear whether the broken bit was larger or smaller than the whole stick before it was broken.

In the short time during which it was possible to experiment in training Emily, she got a clear idea of size, and by corollary, a luminous appreciation of addition and subtraction. The more complicated processes of multiplication and division were not attempted, but the success of the method was demonstrated. Her teacher kept in mind the principle that Emily must not be allowed to help herself with memory, and that the object sought was the building of a bridge over which she could cross from the terra firma of things to an equally solid foundation of ideas.

The teacher proceeded with one idea at a time, beginning with size. She asked Emily whether she thought the side of the table or the back of the chair was longer, and

then had her measure them with a ruler. She wrote down the two measurements, and the teacher asked her which was longer according to the measure. Emily didn't know. She was much less certain than when she gauged with her eye. But after she had measured a great many things, she got a general estimate of one foot linear measure, and the teacher then asked her to say in terms of feet how long she thought various objects were. Emily at this stage was very amusing. One day a very little boy came in who reached about to Emily's waist.

"How high do you think Ernest is?" asked the teacher and Emily answered:

"Seven feet."

"And how high do you think you are?"

"Three feet," said Emily. Then she measured out three feet and seven feet on the floor, and the nonsense of the answer dawned upon her. So that gradually, by always making her verify or disprove her answers, by the *reductio ad absurdum* principle, the idea of relative size began to have an inde-

pendent existence in her mind. Whatever the device used, sticks or measurements or playing store with paper money, Emily must always estimate in figures the relative sizes of two things, and then, without being told "yes," or "no," by the teacher, assuming her answer to be correct, carry it out to its farthest conclusion.

4. Jacob Wolfsohn was sent as a last resort to have a mental examination, because he was a naughty boy in school. He threw ink and tormented the other boys and was restless to an exasperating degree. No especial complaint was made of his lessons, although of course with such behaviour he was not very studious. Jacob was ten years old, normal height, stocky, appeared rather bashful, but talked with great freedom when he was started.

He showed great ambition to do everything that was asked of him, and did it well. The clue to Jacob's trouble lay more in the way he did things than in the actual working of his faculties. In crossing out letters, for

instance, he showed good homogeneous attention by missing only two *T's* on the page, but he crossed them out very quickly, and often hit the letter next to the one he was aiming for. This fact, and the observation that in spite of paying close attention he got very much rattled in counting taps, gave the examiner a notion. She suddenly threw him a ball from about three feet away. He missed it. She then got up and played ball with him at an easy distance. He muffed the ball four times out of six. When he played by himself, throwing the ball against a wall, he could keep it up only from two to ten times, which is very poor for an able-bodied boy.

Jacob's associations were as follows: "Take, *ball*, cat, rat, vase, mean, very, *caught*, rough, geese, noise, day, money, *baseball*, *bat*, butcher, fireman, ten, ninth"—written almost without pause. He wrote them after the ball-playing, and it will be noticed how jerky and non-continuous they are. It is interesting to see that the ball association,

which would naturally be in his mind, instead of appearing in a group, as it would to most people, reappears at intervals in the words italicised.

The answer to Jacob's difficulty is simple enough to describe, but hard to account for. This boy is one of the hundreds of cases of suppressed hysteria. Going from effect to cause, some psychologists account for the trouble in this way: An outside stimulus travels to a nerve centre in the brain. That nerve centre is so excitable that instead of the energy of that stimulus being directed along the proper motor channels it tends to overflow into neighbouring channels and appears in a confused response to the stimulus. The result appears most commonly in the condition which we call being "rattled." Any case of stage fright, "losing one's nerve," and so on, is a case of temporary hysteria, where some stimulus, either intensified or unexpected, over-excites the nerve centre which it reaches. But beside these temporary cases, many more people than one sup-

poses are handicapped from birth by an irritable condition of their brain centres which operates so perversely that a sudden call on their energies, or a command, or anything that needs a little effort, confuses instead of spurring their faculties. Jacob, for instance, could do well enough the working out of anagrams, memory tests, and so on, and the examiner noticed that he answered questions much better when they were put to him straight than when they were prefaced with, "Now see if you can answer this—". In a word, when Jacob realised that a mark was set for him, that now he was called upon, now was the moment, whether the response were physical or mental, he muffed. This condition of hysteria might be described as the lack of team play between consciousness and self-consciousness.

With the evidences of this suppressed hysteria, the examiner explained Jacob's troublesome behaviour quite simply. Congenital hysteria of this sort has several manifestations, and commonly they are physical.

That is to say, that the over-excitement of a brain centre tends to affect first the purely motor or muscular part of the response, as in Jacob's failure to hit the exact letter he was aiming for. Naturally, then, such a person is at a disadvantage in games of skill and athletics generally, because the call to excel routs his co-ordination. Jacob, therefore, being probably a good deal of a butt on the street with the other boys, because of his inability to catch, gratified his *amour propre*, of which he had plenty, by getting even with them in the schoolroom, where handicaps were equal.

Another effect of hysteria is tension. The result of this irritability of some of the brain cells seems to be that the muscles are kept taut, never fully exercised and never wholly relaxed. When Jacob lay down flat on a couch and closed his eyes, he could not keep his eyelids from fluttering, and in trying him out with various movements, it appeared that he was stiff, and not disposed to make as full a movement as the joint allowed.

This tense condition and inability to relax shows itself in restlessness, and Jacob's fidgeting in school was the outcome of his perpetual state of semi-fatigue.

Acting upon this diagnosis, Jacob first must learn to catch. He was set to playing ball against the wall every day. At first the teacher paid no attention to him, and he did not count, so that he might become used to handling a ball without having his self-consciousness aroused. Then after a while he counted, and still later the teacher watched him and urged him on. The next step was playing with the teacher and adjusting himself to the uncertainty of another person's movements. Along with the ball-playing he swung Indian clubs and did various limbering exercises like touching the floor with his hands without bending his knees, rising on his toes and bending his knees, and so on. Then he played hop-scotch with the teacher, and at first became so excited that he could not hold his leg up beyond two squares. Finally he lay on his

back on a couch, so that he might relax. It seemed impossible for a time to get the stiffness out of him, or to stop his eyelids from fluttering, but the teacher read to him in a monotonous voice for a few moments, and the combination of this soothing with his purely muscular fatigue brought about a complete relaxation.

These experiments had quick results. Jacob had his training every morning for three-quarters of an hour before he went to school, so that he now went into the classroom having fully stretched his muscles and fully relaxed them, and having just so much the less craving to fidget. He got no lectures on his behaviour, but the practice he got in catching, and later some coaching in various athletic "stunts," seemed to raise his social status in some way so that his feuds with the other boys dropped off. It was very human of Jacob to be naughty because he didn't measure up, and equally human of him to mend his ways when he learned how to do things.

CHAPTER XVI

RECURRENT PROBLEMS

NOT only do certain types of backward children appear in generation after generation, but certain stumbling-blocks present themselves to many different kinds of children in one class after another. Why teachers should constantly be finding children who read "was" as "saw"; why a child can write his name and then cannot read it; why he puts down "30" as "03," are all puzzles and apparent inconsistencies which psychology, if it is to be practical, must explain. And since these inconsistencies crop out in many sorts of children in all stages of development, it is evident that for the moment we must stop analysing the individual child and discuss instead the mental processes by which we all achieve reading, writing, and arithmetic.

The most frequent complaints are about reading. It is curious how often a teacher has to wrestle with the trick of reading backward—curious, because the process of reading and writing comes so easily and remains so automatic with most people that it seems like a separate mental faculty. But, as a matter of fact, the act of reading and writing is a very complicated co-ordination, and instead of wondering at the hitches, it is marvellous that it ever becomes ingrained. Our little children of to-day have for their starting-point an accomplishment which used to be the distinguishing mark of a learned man; we approach then with some respect the analysis of a process which has not yet become an inspiration.

One must carry about an enormously complicated and arbitrary lot of symbols in order to receive and convey ideas—the printed alphabet, capitals and small letters, and all the permissible variations of script. The child, learning his printed letters, is not making so much an effort of memory as building

up a relation, an association if you will, between sight and name and sound. A certain shape A has a certain name, ā, and later it appears that it has certain sounds, ā, ă or ah. When the child first sees A, and hears the sound ā made by his teacher, the first faint pathway of an association is traced between visual and auditory centre. When he repeats "ā" after his teacher, still looking at the shape A, he marks the pathway a little deeper, through the re-enforcement of the muscular associations of speech. When he copies A, looking at it, hearing ā from the teacher and repeating it, he traces a still deeper path with the particular muscular operations of hand and arm which are involved in making the shape A. The chain of normal associations is then complete, and there remains only repetition to establish that particular pathway. But in order that these associations shall be normal, certain conditions are necessary.

The visual image of A must be clear; not only must it be properly focused on the

retina and conveyed to the brain by an unimpaired optic nerve, but when it reaches the visual centre in the brain it must find there a substance at once so yielding and so resistant that the image is recorded as a sensation, a fact, an idea, distinct and by itself, not blurred and confused with some other image.

The auditory image must likewise be clear, carried by an unimpaired sense organ to a properly functioning auditory centre, so that when the pathway is set up between the visual and auditory image of A it will connect two images that are distinct.

The highly complicated speech mechanism, which according to modern psychology involves not only the tongue and facial muscles, but a special speech centre in the brain, must present that same effective combination to insure a clear mental image made by the spoken sound ā. In making the shape A, like the printed letter, the very little child is at first guided by the teacher's hand until he has identified the muscular

movements of his hand and arm with the visual image of the marks on the page and comes to see that certain marks put together will make an image something like the letter A. This identification of certain motor impulses with certain resulting visual images is the beginning of what we call elementary form-sense, and, like the other steps in the association process we are discussing, it requires clear visual images and well-defined motor control. Lastly, when the brain centres, the sense organ, and the muscular co-ordination all function properly, the acquisition of the letter A still requires plasticity in the association area of the brain so that the path may be clearly and easily marked and permanently retained.

After the child has learned to call all the letters of the alphabet by name, and to write the right shape for each name, he is ready for the next link in the chain. "What does B say when it talks?" we ask a little child, and it seems an easy and obvious step that he, having learned to say b-b-B, should further

learn that b-b-b-b is the sound of B. The sound of every letter is contained in its name, except in the case of w, while the vowels, and c, g, and y have alternative sounds to be learned. So that with the reminder in the name, it would not seem very difficult to master the sounds. And yet one meets quite frequently with a child who will say that the sound of d is f, the sound of p is s, the sound of g is h, and so on. The reason is that the child's auditory image is blurred. This image is clear enough for the simple connective between the shape d in the visual centre and the sound d in the auditory centre, so that the sound d is not associated with any other shape, but when it comes to the next step of differentiating the sound d all by itself from all the other letter sounds, the confused image spreads its blur over neighbouring images, and we have the slurring of d with f, p with s, and so on. If the image is only slightly blurred, the confusion will be constant—that is, d will always be confused with f, or with some other letter which is a

matter of neurological chance. If the image is considerably blurred, the confusion will be indiscriminate—that is, the child will sometimes say that the sound of d is f, sometimes r, sometimes m, or whatever letter the ebb and flow of his memory may bring to the surface. And of course, if the image is seriously blurred, he will not be able to make the first connection between sight and sound.

A similar confusion in the visual centre accounts for the difficulty some children have in reading what they themselves have written. When a child is told to write A, the sound ā calls up the visual image A. The visual image in turn sets in motion certain muscular operations which produce the shape A, conforming to the visual image A. Let us suppose the child to write a sufficient number of letters so that he is not apt to remember their sequence. He now must read what he has written, and reverse his mental process. The sight of the letter A which he has written stimulates the visual image A which he already has in his mind,

and it should call up the auditory image ā, which in its turn sets in motion the speech mechanism and the child pronounces what he has written. But suppose that the visual image of A is blurred—that is to say, suppose the original image of A, what we may call the model A, is not held with sufficient distinctness so that the slight aberration of the written A can still be identified with it, then it is evident that the hitch in the visual centre will break the connection with the auditory centre, the chain of associations will be interrupted, and the child cannot read what he has written.

The same process, which has just been outlined in its simplest form, is the means by which the child later reads words and sentences. And when he writes his own name and cannot read it, his blurred visual images account for the discrepancy, in the same fashion as when he confuses separate letters. For as we learn to run letters into words, the words themselves come to stand as simple symbols and we do not see "cat" as three

separate letters, c, a, and t, but as the simple image, cat.

This fact, which we may call the symbolisation of words, is at the base of the very complicated system of phonics which is at present so widely taught in the primary grades. This system, instead of teaching children the alphabet at the very beginning, teaches them a number of whole words all at once, on the principle that since they must learn certain symbols which seem to them perfectly arbitrary, it makes the process less mechanical if the symbol represents an idea. So that they learn to recognise "cat," "boy," "see," together, with certain recurring combinations of letters and these root-words, as it were, are known as phonograms. Later when they come to longer words, it is urged that reading becomes easier because, from the careful selection of the original phonograms, they recognise familiar syllables, and need only pronounce them together. The phonic system has much in its favour, especially for normal children; but it is largely

responsible for the peculiar difficulty that modern teachers meet with when a child persists in reading his words backwards.

In the common case of reading "was" as "saw," the child is guided almost wholly by visual images, and if these fail him he has no reinforcement. Under the phonic system, he has learned that the symbol "was" is called *was*, and the same direct association is set up between visual and auditory centre as in the case of *A*. But if he has learned his alphabet first and has learned to form the word "was" out of the letters *w*, *a*, and *s*, each of which has its own visual-auditory connection, it is easy to see that his impression of the word "was" will be three times as substantial as if he had learned it as a simple symbol. So that in the first case, where "was" is a phonogram, if that visual image is not perfectly clear, when the child meets those same letters in reverse order, *i. e.*, "saw," he simply realises that he has before him the general shapes that are to sound as "was," and pronounces it so. But if he forms his

words letter by letter, he is not so apt to make this confusion, because each letter of the word conveys its own idea.

In this habit of reading backward, the phonogram which prevails, and is most frequently substituted, is, of course, the one which was learned first or is most often met with, or for some reason has made the deeper impression. It sometimes happens that a child invariably reads "was" for "saw" and "saw" for "was" with the greatest impartiality, and it generally appears that the meanings of the two phonograms have been interchanged. Quite as frequently a child will write "was" for "saw"—keeping our same example—although he will say it right. He will do one of two things. The teacher says, "What is that word?" The child reads correctly, "was," but writes "saw" and reads "saw" from what he has written, or he reads "was," writes "saw" and reverts again to "was" when he reads what he has written.

In the first of these two cases, he is clear enough to read "was" correctly from the

book. When he must write it, however, he thinks first in terms of separate letters and their sounds, because he had to learn to write by letters and not by phonograms; and coming to write "was," the letter *s* being the last and also the most vivid impression in "was," he starts off with that; finally, his training in phonics suggests the remaining letters, aw, as familiar shapes in the image "was." When he reads his own writings in this first case, he reads what he has actually written, "saw," because his mental images of "was" and "saw," as far as reading goes, are clear enough for him to distinguish when he sees them before him.

In the second case, where he writes "was" as "saw" and then errs again in reading it as "was," the child is probably so strongly under the persuasion of what he was told to write that he does not stop to scrutinise, but remembering that he was to write "was" declares that he wrote "was." In each case the reason for mis-writing the word is the same.

Still another type of difficulty is spelling a word orally right, but writing it wrong. A child may spell "scratch" orally as s-c-r-a-t-c-h, but write it "scarch." Or, as in one case, after spelling correctly he may write "they" as "ton" and "ton" in turn as "amy." When a child is asked to spell a word orally, he first hears the word, then he visualises it in a more or less conscious fashion, or else he names the letters whose sound he has heard and spells phonetically. These are the two different ways in which people spell, aided in some degree by memory. Now if the child spells phonetically the very fact of speaking the letter guides him in conforming to the word which he has heard. But when he comes to write this same word, he is guided only by the visual image of the letter he makes and he is apt to confuse the order of sounds in the word, or in more extreme cases, to mistake some of the letters on account of the blurred visual-auditory connection which has been described. If he spells by visualising, however, he will be

more likely to spell correctly in writing, because the shapes of the letters that he makes guide him in the same way that the sounds of the spoken letters do the child who spells by ear.

The infinite variety of these aberrations is so familiar to the teacher that one need scarcely apologise for not trying to cover the multitude of special instances that occur along these various lines of deviation. Were they discussed to the finest hair-splitting, however, the basic principles would remain: the clarity of the visual and auditory images, and the formation of an unswerving path between them.

When a child, therefore, has any difficulty of the general kind we have been analysing, one must look first to his fundamental images and their connections. For this reason it is best to begin with the alphabet, and insure a vivid image of each letter so that the child may build up his words out of a living substance as it were. Various ways of doing this have been sug-

gested in one chapter or another, and still further devices are described in the chapter on training.

In the multitude of arithmetical puzzles which the backward child so ingeniously contrives to present to his teacher, a few arise from the same causes that obtain in reading and writing. When a child can tell that $9 \times 5 = 45$, but does not know whether to put down 4 or 5 first, he has hauled the right answer out of his memory of the multiplication table, but when it comes to writing it, the symbols are still arbitrary, and if his mental images are the least bit confused, he cannot tell whether 4 or 5 stands for four.

Another case one sometimes meets is that of a child who can add up a column of figures which total 31, and give the right answer, but who will write it down as "13." To understand the reason for this, one must realise that arithmetic involves a mental process quite independent of the symbols it uses.

Counting is the elaboration of our first vague perception of the difference between few and many. The idea of unity first stands out clearly, and from one, and another one, and then another one, and so on, we evolve the process of counting. Arithmetic in turn is the shorthand of counting, and necessarily uses certain symbols to stand for its short cuts. The mental assimilation of symbols in reading and writing has been described; in arithmetic it is a similar process save that the digits correspond to words rather than to separate letters. The symbol 5, for instance, conveys a certain idea, but the letter P conveys no idea at all save as it is associated with this or that word. But the ideas conveyed by numbers are limited to conception of size and quantity, and in this restricted field they are harder for most people to grasp than language whose ideas range over the whole field of sound, colour, and action.

It is clear that the mathematical processes of counting and combining can go on without

reference to the symbols by which they are expressed. When I write $3 + 2 = 5$, I must first get the answer "in my head" as we say, and then translate the answer into a digit. Simple arithmetic is done in two ways: partly by proof, that is the process of verification which makes children count on their fingers, and partly by memory. As we grow more expert, memory largely takes the place of proof, so that when I write that $8+7=15$, I do not work it out each time, but I remember that such is the answer that is capable of proof. So that after this purely mental process of combination, it remains to express the result, and we are now at the point of the same process that the child uses when he is told to write "A" or "cat." That is to say, the translation of the idea into the symbol follows the same course whether it be numbers or letters.

With these observations, one may consider the case of the child who adds up a column correctly to 31, and writes the answer as 13. Let us suppose the figures to be

3
5
7
2
4
6
4

31

On the one hand we have the child who will say the answer to be 31 and write it 13, and on the other is the child who will write the answer as 31, but who will say that it is 13.

In the first case, the child goes through the column in his head. "Six and four is ten," he says, "and four is fourteen and two is sixteen and seven is twenty-three and five is twenty-eight and three is thirty-one."

"Thirty-one," he announces.

But the writing of 31 in figures involves an entirely different set of mental operations, and, as we have said, when he comes to write down 31 which he has just spoken, he is about to put in motion the same train of activities that are called for by the order to write "was." And supposing that owing to blurred

visual or auditory images, or ill-defined association paths, the child has difficulty with symbols, he is apt to write 13 for 31 without any more reflection on his powers of reckoning than writing "saw" for "was" indicates that he cannot talk straight.

In the second case, where the child adds the column and writes the answer correctly, but reads it wrong, we have a condition parallel to the one in which he cannot read what he has written. He adds mechanically 3 and 5 and 7 and so on, very probably counting out the numbers on his fingers, until he arrives at the end of the column and writes down 31. He has learned, that is, and assimilated the identification of the successive counts, one, two, three, and so on, with the figures 1, 2, 3; so that it is easy for him as he adds up the column to translate his results into figures because he knows the succession of figures just as he knows the succession of counts. In other words, if the child were asked pointblank to write the number 31, he might perhaps not be able to do it. But

when he arrives at 31 after a process of addition, the very fact of consecutiveness guides him in putting down the right figures. In reading the number he has written, while he knows 3 and knows 1, he is at a loss to express the combinations, and he is apt to say 13, because it contains the same figures, and as a smaller number it is more familiar to him than 31.

Teachers often wonder why a backward child who is learning to count will learn 1, 2, 3, and always stop at 4, or will always skip 8 and 9, or 13, or whatever number it may be. It is sometimes possible to explain a particular freak of this kind in a particular child, but usually it appears to be quite without rhyme or reason. But after all, it does not matter why it is this or that number; what one wants to find out is why it should be any number at all. And the underlying reason is always an ill-established associative connection, which in many prevailing methods of teaching is made still more vague by fatigue. Let us suppose the child to

stop persistently at 4 in counting, although once helped over 4 he can go on. We do not know why he picked out 4 for a stumbling-block; perhaps the first pathway between auditory and speech centre found its way through a brain area of small plasticity; perhaps in his particular make-up it is hard for him to pass in speech from the *th* sound in three to the *f* sound in four. Perhaps a number of things; but at all events it is clear that 4 has not been grasped with the distinctness of the other numbers, and that consequently it must get an especially vivid setting before it will be grasped. Parrot-like repetition will not serve, nor a repetition of the same devices which were used to teach the other numbers, because, having failed to produce the impression, their effect tends to be simply one of fatigue. But if the teacher sets the number 4 in a quite new environment, by sharply clapping her hands when the child comes to it, or by flashing a bright button so that it catches the light, or by any such device, the number 4 will shortly

establish itself in the natural sequence of counting.

Another complaint is that backward children write 30 as 03. In this kind of difficulty, the teacher must remember that the child does not reason out the system of tens, but learns the combination numbers as ploddingly as the original digits, so that writing 30 as 03 is an idiosyncrasy of mental images like the confusion of 6 with 9.

The arithmetical questions discussed here are a few of the apparent contradictions which teachers cannot account for in the face of correct reckoning. The inaccuracies of actual mathematical thinking have been discussed under the various mental faculties which are brought into play. And now, when the child has come safely through reading, writing, arithmetic, and spelling, he has passed the chief pitfalls of the mental borderline. For the rest, supposing his memory and attention to have been trained into normal efficiency, the backward child will progress in history, geography, composition,

and so on, in proportion as his own initiative imagination is stimulated. That is to say, the teacher who after having brought her child to a reasonable fluency in the three R's, and having diagnosed him with sufficient care to know that his fundamental faculties have no gross defect, still finds him dull in his other school subjects, may be very sure that the simple principle of making him give out instead of take in will be effective. It is the same principle that underlies the modern cry in education: get something that interests the child; it is the same principle that accounts for the great success of nature study, because there the child has some outlet for reaction and expression; it is the principle of uncovering and encouraging the creative instinct, not necessarily to artistic or literary achievement, but to any activity in which the mind with its own materials adds something new to its own store.

This stimulation of initiative, of the groping creativeness that is in all of us, I take to

be the highest function of education and its most fascinating impulse. But the daily business of education is concerned with getting enough knowledge and dexterity to meet the world on its own footing; and many who must meet it so are handicapped by some hitch which like a black thread runs through all their mental operations. And so it is that side by side with awakening the child's imagination and quickening all his responses must go a very careful search into the fundamental workings of his mind, and a daily hammering at the particular obstacle which prevents their co-ordination.

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